

THE AMERICAN PSYCHOLOGIST

THE AMERICAN PSYCHOLOGICAL ASSOCIATION, INC.

REQUEST TO THE MEMBERSHIP FROM THE POLICY AND PLANNING BOARD

The Policy and Planning Board is to meet in Totowa, New Jersey at the invitation of the New Jersey Training School on April 12-15, 1947 to consider proposals to be transmitted to the membership prior to the Detroit convention.

Members of the Association are invited to suggest problems to the Board for its consideration. An effort is made to devote attention to long-range planning. Communications may be addressed to the Secretary, Dr. Marion A. Bills, Aetna Life Insurance Company, Hartford 15, Connecticut, or to any member of the Board.

Communications already received have placed the following items on the agenda. Comments on these or other items will be welcomed. The work of the Board will be facilitated if its energies are devoted to concerns which are real to the membership.

1. Review of the functions and operation of the central office.
2. Review of the financial situation of the American Psychological Association.
3. A resolution from the Illinois Association for Applied Psychology regarding research on current social problems (see *American Psychologist*, November, 1946).
4. Further consideration of popular books or magazines in psychology possibly to be inaugurated by the American Psychological Association.
5. Problems arising in connection with the establishment of the Board of Examiners in psychology, and other matters relating to certification.
6. Problems connected with the accreditation of graduate departments in psychology.
7. Consideration of further aid looking toward establishment of state organizations and strengthening their activities.
8. Problems arising out of the divisional structure under the revised by-laws.
9. Relationship between the APA and UNESCO and other international agencies.
10. The improvement of the general programs at the annual APA conventions.

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THE AMERICAN PSYCHOLOGIST

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HISTORY OF PSYCHOLOGICAL STUDIES OF THE DESIGN AND OPERATION OF EQUIPMENT¹

WILLIAM E. KAPPAUF

Princeton University

WHEN the Army and Navy recruited psychologists early in the war, assistance was sought primarily in the areas of selection and training of personnel. Accordingly a great number of psychologists became engaged in programs which, as described in part in previous issues of this journal, involved the validation of selection and classification tests, the preparation and validation of various types of training aids, and the coordination of new tests or training procedures with those already in use.

At the same time a few research programs sought the services of psychologists to insure the more satisfactory design of some items of military equipment, to insure design which would take account of particular psychological and physiological characteristics of human operators. Typical of this work was that which was initiated in the design of dark adaptation goggles, sun scanning devices, and communications equipment. As the war progressed this phase of research in applied psychology assumed greater and greater importance and involved more and more types of equipment. The field developed as much through the initiative of individual psychologists as it did through specific service requests. In many cases psychologists who had been requested to prepare new training materials or training bul-

letins found previous operating instructions incomplete or unstandardized. Specific study and research was required to elaborate the old procedures or to demonstrate the relative merits of alternative methods of operation. With service approval, psychologists conducted such research and then incorporated the indicated procedural changes in the training bulletins or training programs which they were developing. But having extended the field of their work from "how to teach" to "what to teach," many psychologists found it inevitable that their thinking turned to equipment design as it related to efficient operation. Increasingly, contributions were made to the solution of design problems. The effectiveness of these early studies of design led the services to request their continuation and extension.

Of course, none of these areas—selection, training, equipment design and operation—was distinctly new to the psychologist. These had been central problems in the field of industrial psychology for many years. What was new, however, was the more general acceptance of the principle that operating procedures and equipment design should be established on the basis of sound psychological data.

In number, the military problems of design and operation were many. This was most certainly the result of the recent rapid strides which had been made in the technological design of equipment. Engineering developments had outstripped the rate at which the engineer could adapt his equipment to efficient human use. To the psychologist the field was a rich and challenging one. As evidence of his interest one may note the many names he applied to describe his work: *human engineering, biomechanics, psychological problems in equipment design, the human factor in equipment design, applied psychophysics, systems research*. Further evidence of the importance which participating psychologists

¹ This article and the two which follow it were written at the request of the editor. They illustrate a type of psychological work—an applied experimental psychology—which gained new importance during World War II and which is continuing in the post-war period. The three articles illustrate the type of work being done but do not describe all aspects of it.

In addition to the programs described by Taylor and Fitts in the two following articles, others have developed in the Special Devices Division of the Office of Naval Research and in the Naval Medical Research Institute. In order to supplement their own research facilities, the military services have contracted with a number of universities for psychological research on problems related to those discussed in these three articles. DAEL WOLFE

attached to this work is found in the fact that special sessions were given over to problems of equipment design and operation at two major meetings of psychologists immediately after the close of the war.²

Studies of operation and design problems typically followed a pattern familiar to those acquainted with similar industrial work. Some problems were handled on a thorough-going research basis until the best procedure or the best design and arrangement had been experimentally determined. Others were handled as adequately as possible on the basis of facts or principles already available in the psychological and physiological literature. Although there was no fundamental difference in approach or method between military and industrial research, certain distinguishing features of military job situations changed the emphasis or plan of the work to an appreciable extent. At least two of these are worthy of mention.

In the first place, a high proportion of military jobs are such that continuous precision or continuously acceptable performance is required. These jobs resemble laboratory pursuit meter tasks but have the consequence that failure to maintain continuously precise operation may mean loss of life or failure to accomplish a mission. In this respect, many military jobs have few or no counterparts in industry where quality or precision often reflects only a worker's finishing touches or his final skill in bringing a piece of work within a required tolerance. In radar scope interpretation, tracking a target, and other military jobs, it is the continuity of performance that is important. This makes it necessary for the psychologist to pay particular attention to studies of changes in job performance over very short as well as over long time periods.

In the second place, the demand for speed of operation is extremely pressing in military work. For this reason speed becomes a primary criterion in evaluating operating procedures and design arrangements. It is necessary that all operational shortcuts which do not interfere with the maintenance of continuously accurate performance be perfected and made standard practice.

² Joint Army-Navy-OSRD Conference on Psychological Problems in Military Training—August 15–16, 1946. Meeting of the Military Psychology Section of the APA—November 27–28, 1946.

Another feature of the war research program which psychologists found different from the usual work in industry was that they were invited with increasing regularity to participate in discussions and tests of equipment which was not yet in production but which was still in preliminary design or pre-production form. Increasingly, even though slowly, their jobs changed from that of doctoring or rearranging old equipment so that it might be operated with greater success, to that of constructive criticism and study of new devices and weapons. This trend produced a real increase in the efficiency of the production and testing programs. Design from both the technical and operational points of view was considered in a coordinated manner. To be regretted only is the fact that this approach to equipment development was not achieved at an earlier date and with reference to more types of equipment.

Projects concerned with psychological research on equipment were organized under the Applied Psychology Panel and under a number of other divisions of NDRC. The specific directives of these projects varied but some of them were sufficiently broad to include a full range of problems—research on the design of equipment, research on procedures for operating equipment, the development of selection and training procedures, the preparation of training materials in the form of pamphlets and training aids, and, when expedient, the initiation of more fundamental research on psychological factors basic to equipment design and use. General directives of this sort made it possible for projects to organize broad programs of research directed at all aspects of the operating and training job.

In an enviable position, so far as research opportunities were concerned, were those few projects to which newly engineered equipment was made available for study. This equipment was often provided for testing just as soon as a development laboratory or a manufacturer had turned out two or three pilot models. Typical of these projects was one with which the author was associated.³ This project was organized to investigate psychological problems in the design and operation of new

³ Project N-111, Applied Psychology Panel. Personnel included: Henry Birmingham, Clarence Graham, Thomas Hermans, Milton Horowitz, Alston Householder, William Kappauf, William Lambert, Henry Meyer, Franklin Taylor.

anti-aircraft lead computing gun sights and gun directors. The program was sponsored jointly by the Office of the Commander-in-Chief, the Bureau of Ordnance, and the Ordnance and Gunnery Schools at the Navy Yard, Washington, D. C. Through this combined sponsorship, the project enjoyed the strongest support and assistance. A continuous personal and first-hand interest in all aspects of the equipment problem was shared by the several members of the sponsoring groups.

The project was set up in association with the Ordnance and Gunnery Schools. One section of these schools had the responsibility of training maintenance personnel for fire control equipment. At the time that the project was organized, this school was designated to receive at least one experimental model and at least one pre-production model of each new fire control device. These instruments were regularly available to the research project for study and test. Although the amount of research time on the equipment and the number of subjects that could be obtained were usually limited, the work of the project had the important advantage of timeliness. Team operating procedures were tested and developed on the experimental model of each device. Teams were drilled and timed in the use of these procedures. Design inadequacies which hampered swift and efficient operation were made the subjects of reports to the cognizant Navy groups. In most cases these design comments were submitted at such a time that they could be given full consideration by production engineers before the device was put in final production form. When a more detailed investigation of some design problem seemed necessary, the research was planned jointly by the project and liaison groups and then undertaken by the project.

Two steps were taken to insure the indoctrination of Naval personnel in effective methods of operating the new equipment. Under the direction of the Office of the Commander-in-Chief, the project supervised the instruction and drill of special training teams. These teams learned the operating procedures which had been developed through project study. They were then assigned to special duty at training stations or with fleet units where they were responsible for training new crews in the approved techniques. To supplement and assist the work of the training teams, the project, in

cooperation with its liaison groups, prepared pamphlets describing the best operating procedures and outlining practical methods of training men as operators.

The specific accomplishments of the research project during its year and a half of work included an evaluation of the design and operating characteristics of eight different gun director systems, the preparation of detailed operating procedures for six of these systems, the study of several synthetic trainers intended for use with these directors, and the investigation of a number of psychological problems relative to the use of these systems. The latter included a study of methods of rating operator performance on the equipment, an analysis of operator learning curves under different tracking conditions, an experiment on the design of tracking reticles, and a determination of the accuracy of unaided visual range estimation on aerial targets.

Now that peacetime research programs are being set up by the services, one may well inquire into the lessons learned from the work and organization of projects like the one just referred to. The two papers following this develop the specific plans of two service groups for the continuation of psychological research on military problems of equipment design and operation. For these and similar programs, there may be merit in listing some observations on factors which made for success in wartime projects. It will be desirable, in this regard, to distinguish between what will be called specific research, dealing with very specific instruments or devices with a singular use or purpose, and more general research, dealing with devices common to many work situations or purposes.

First it should be noted that there was considerable economy and increased efficiency in specific research when all phases of that research were carried out by the same group. It is readily seen that the problem of equipment operation and the problem of equipment design should be handled by a single group because they are really but a single problem. Both are aspects of the task of fitting a job to a man. To deal effectively with either, a psychologist needs the same background knowledge and the same research skills, and must use the same criteria. But it is also true that when a particular research group has concluded an analysis of operating problems it has thereby acquired the best possible background

for undertaking the supervision of the training program involving the same equipment. This suggests the value of unified group work in the study, development, and introduction of new devices.

Another fact which war research work made readily apparent was that when specific research is required, it is imperative for the psychologist to study in detail the basic engineering and functional characteristics of the device. It is also necessary that he become completely familiar with any current doctrine which might apply to the operation or use of the gear. Thus, the psychologist who becomes engaged in research on operating procedures and equipment design for particular devices ought to be about fifty per cent engineer. He must be willing to dig into gadgets and learn what makes them tick. Then he can talk intelligently to production engineers and ordnance personnel about the equipment and, what is more, he can plan his research and state his results in terms of the functional characteristics of the equipment.

Because of the need for equipment analysis and because of the varied types of research problems which arise, a research staff usually functions more efficiently if it combines a wide range of talents and if its personnel represents a cross-section of a number of scientific fields. One reason why laboratory-trained psychologists frequently did so well in handling war problems was that their training had been well distributed in other scientific fields. By the same token, a balanced staff for any permanent research organization is implied.

War research also showed the importance of the criterion of operator acceptance of new equipment or procedures. No matter how satisfactory a design or procedure may seem as evaluated by other criteria, it has little value if service personnel reject it. Reasons for rejecting a recommended device or method are many: feelings of personal discomfort, biases established through previous training, rumored ill-effects of operation or use. It is well, therefore, to introduce tests of operator acceptance early in any equipment program. In fact, developmental work in cooperation with small groups of operating personnel is highly desirable. The end product, ready for field trials, then already bears a tentative stamp of user approval.

In conclusion, it should be pointed out that wartime research groups bequeath to permanent re-

search units a number of organizational problems in their applied work. That these have been anticipated as continuing problems will become clear in the articles by Taylor and Fitts which follow. One of these problems is that of level of validation. Should validation be made on the basis of full scale field trials, simplified field trials, performance in simulated action situations, or performance in isolated tests of unit operations? This problem was ever-present in the work of psychologists during the years of the war and the solutions adopted were often expedients which will not suffice in more rigorous research programs. Level of validation remains a matter of concern in every experiment on equipment design.

Then, too, there is the need of establishing more satisfactory ways of analyzing group performance and of setting up criteria and standards for measuring group performance. Service units are for the most part teams rather than individuals. This means that group coordination must be brought under more careful study. Only when coordination or teamwork is adequately measured can use be made of appropriate group criteria in evaluation tests of new equipment or operating procedures.

Decisions must also be made on the level of generality or specificity of research. A program of specific research, seeking answers to specific questions about particular pieces of equipment, is the more practical program when particular devices have been decided upon as the ones needed and when the time for research is limited. If, on the other hand, one's only guide is a set of general plans for future equipment development and there is time to explore features which might be shared in common by many work situations, then more general research can be planned. Results can be stated in a way which will make them useful in the later design of elements or units in many and various kinds of devices. Research which is less specific appeals to the psychologist because it fosters the development of a more organized body of psychological knowledge. But at the same time no small factor in his preference for general purpose research is that he may carry it out in the expectation that the results of his work will not be limited in application to national preparedness for war, but may see continuing use in the design of devices and materials for peaceful living.

PSYCHOLOGY AT THE NAVAL RESEARCH LABORATORY

FRANKLIN V. TAYLOR¹

Psychology Section, Radio Division #3

Naval Research Laboratory

THE Psychology Section at the Naval Research Laboratory is a direct outgrowth of NDRC Project N-111. At the close of the war Dr. R. M. Page, head of the Radio Division #3, invited members of the project to join the permanent staff of the Naval Research Laboratory to continue the NDRC work on an expanded basis. Three members of the group transferred to the division on October 1, 1945 and started the work of the Psychology Section. Since that time the Section has grown to fifteen members and plans are laid to expand the Section by at least six more.

At present, this research group is the only psychological group at the Naval Research Laboratory and is one of the two psychological agencies under the Office of Naval Research. The other organization, which is directed by Leonard C. Mead, is the Human Engineering Section of the Special Devices Center.

The Naval Research Laboratory is located in Bellevue which is a part of Washington, D. C. A branch laboratory is located in Boston, Massachusetts and a field station at North Beach, Maryland. The Laboratory is best known for its work in electronics, though divisions representing other areas of research are growing and will assume a much more important role in postwar research.

PROGRAM

Though the Psychology Section is administratively a part of the Radio Division #3, it is intended that the Section will grow to serve all divisions in the Laboratory. This means that eventually the

¹The opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Section will carry on work relating to radar, sound, and optical instruments in addition to research relating to missile and fire control problems which are in the domain of the parent division. The Section has already acted in a consulting capacity on a number of problems originating outside of its own division. These have been concerned most frequently with problems relating to the clarity of radar images on cathode ray tubes, though service has been rendered on problems involving radio direction finding and sonar displays.

However, until such a time that the Section can obtain sufficient personnel to permit expanding research into the other fields represented at the Naval Research Laboratory, its main work will be directed along the following three lines: the design of gun fire control and missile control instruments from the point of view of ease and efficiency of operation; the design and evaluation of synthetic gunnery and missile control trainers; and basic psychological research. Each of these areas will be described separately.

GUN FIRE CONTROL AND MISSILE CONTROL INSTRUMENT DESIGN

As is pointed out by Kappauf in an accompanying article, the armed services recognized early in World War II the need for a more careful consideration of the role of the operator in the design of fire control instruments; since fire control devices frequently failed to direct gun fire with the accuracy which was expected from the mathematical and mechanical characteristics built into the equipment. Much of the inaccuracy was traced to faulty operation which was often due to poor design of the controls. One of the tasks of the Psychology Section is to de-

sign control equipment with a view to assisting the operators in their difficult task.

Special Problems in Fire Control Instrument Design

Psychological work on fire and missile control instruments differs in certain significant ways from traditional industrial psychology and from "human engineering" as applied to nonmilitary devices. In some cases these differences serve to distinguish all military instrument design research from its civilian counterpart but in other cases the special problems are intrinsic to the fire control task and the equipment devised to accomplish the task. The first two problems described below are general to all military instrument design research. The last problem represents a special characteristic of fire and missile control apparatus.

1. *Mechanical Complexity.* The psychologist working on the design of military devices faces a mechanical complexity seldom met with in civilian industrial psychology. This mechanical intricacy stems from military urgency. During war, planes must fly, bombs must be dropped with accuracy, and air attacks must be repelled. These events cannot be postponed until military apparatus has been refined, simplified and "foolproofed". When the enemy is attacking it is necessary to employ the best countering weapons in existence. Often these "best" instruments are far more complicated electronically and mechanically than would be tolerable in the commercial world.

Mechanical complexity imposes a very real obstacle in the way of the military design psychologist. In order to be of greatest value to the military organization which he serves, the psychologist must understand the mechanics and construction of the devices with which he is working. He must be familiar with all of the functional elements in the equipment, he must know how these elements work in combination, and he must know the result of casualties to the parts. These things, it must be emphasized, he must know in fact and not merely in theory.

Since the design work of the Psychology Section is applied to gun and missile aiming systems; the psychologists in our organization must be willing to "get inside" these devices. The simplest of these mechanisms consists of a handlebar tracking arrangement upon which is mounted a lead-computing

gun sight. The target is tracked by an operator who observes through the sight either the optical image of the target or its radar image. The operator turns the director by holding the handlebars and walking around the supporting pedestal; he elevates the sight by pushing forward or downward on the handles.

Below decks, a second operator handles the radar controls. Once the radar is on target, range is fed automatically through mechanisms in the director pedestal to the gun sight. On the basis of this range information, angular tracking rate and other quantities are fed into the sight, the proper lead angle is generated, and aiming information is transmitted electrically to the power drives of the guns.

The larger gun director systems involve power driven turrets manned by crews of five to seven men. The target is tracked optically by one or two men or by radar either manually or automatically. The missile control systems which are projected will contain automatic tracking devices but the problems of acquiring targets and taking over the control of the missile will require operator adjustments of considerable complexity.

It should be apparent from the description of these systems that considerable time and effort must be invested by the psychologist in learning the mechanical intricacies of the devices before he is competent to deal with them on an engineering basis. This investment must be made, however, in order to be of greatest service to the fire and missile control designers.

2. *Knowledge of Doctrine.* In addition to an interest in mechanical and electronic devices, the psychologists who work with military instrument design must also possess a willingness to acquire a fund of complex military doctrine. Since the operation of a new instrument will depend upon current military rules and practices, the design psychologist must be thoroughly familiar with battle doctrine. In the field of fire control this means that a knowledge will be required of standard primary, secondary, and emergency firing procedures; safety rules; methods of obtaining and transmitting information concerning possible targets; and a host of miscellaneous practices relating to the contingencies of shipboard operation.

3. *Precision Operation.* The first two problems described above are quite general and apply to

aviation psychology as well as to fire control research. They represent fields of interest or knowledge which differentiate psychologists working in any type of military engineering design from those in traditional industrial psychology. However, a characteristic of psychological research in the field of fire control which belongs in quite a different category is the matter of the high precision task required of the operator. In industry and in many military tasks the operations required are a series of simple motions arranged into complex sequences which are repeated frequently. The major aim of psychologists working with this class of actions is to eliminate as many of the component responses as possible and to speed up all others.

The actions called for in fire control operation are of a different sort, however. The major task of a firecontrolman is the tracking of targets. Though the responses required in target tracking are simple, they must be performed with great accuracy and sometimes for long periods of time. The delicacy and precision required of tracking adjustments presents the psychologist with new problems not ordinarily met with in industrial psychology, and for which the standard research methods of job analysis and time and motion study are quite inappropriate. One of the tasks of the members of the Section is to devise fitting methods for research in this area of human response.

Design Research

The ideas behind the design modifications made by the Section originate in research. This research may take the form of field studies or of systematic experiments performed in the laboratory.

Field research, being the more difficult of the two procedures, is used only when absolutely necessary. Field studies are called for when a redesigned fire control system is to be tested, when alternative operating procedures are to be compared or, in short, whenever it is necessary to test the overall operation of large pieces of equipment under realistic conditions. The great difficulty with field studies arises from the fact that the number of variables which must be controlled or ruled out through randomization is very large. The necessity of equalizing weather conditions, real target courses, operator experience, and a host of less important variables makes psychological field research on fire

control equipment a technique to be employed only as a last resort.

Design research done in the laboratory differs only in its orientation from traditional experimental psychological research. Whenever necessary, targets are simulated mechanically or electronically, and records of response are obtained by standard photographic or kymographic means. At present the Section is engaged in determining the best design for a tracking control mechanism. The following problems are being investigated with a device which simulates electronically the horizontal component of aircraft target motion and which records tracking error and tracking rates:

- (1) The accuracy of tracking with joy stick versus pistol grip controls.
- (2) The effect of different variable and constant aiding ratios on the accuracy of joy stick tracking.
- (3) The effect of different sensitivities upon the accuracy of joy stick tracking.
- (4) The effect of different relationships between the direction of motion of the joy stick and the resulting apparent target motion on the accuracy of tracking.
- (5) The effect of different amounts of damping and inertia upon the accuracy of tracking.

When these studies have been completed and the apparatus has been modified to include the elevation as well as the azimuth component, further research will be carried out along the following lines:

- (1) A comparison of the accuracy of two men tracking in tandem with that obtained with one man tracking in elevation and the other tracking in azimuth.

- (2) A comparison of two man versus one man tracking with various types of control mechanisms.

A second device containing a target-simulating mechanism is being constructed for the purpose of testing under more or less realistic conditions the findings obtained in the studies listed above. The device is a power-driven, dummy director mounted on a platform which can be made to roll and tilt in simulation of ship motion. The device is being built to accommodate different types of tracking controls, and the control circuits will be arranged to allow a wide variation in control sensitivity, nature of aiding, and aiding ratio. Both of these devices are to have target mechanisms which will allow a

sufficiently wide variation in target speed to simulate both ordinary aircraft and high speed missiles.

DESIGN AND EVALUATION OF SYNTHETIC GUNNERY TRAINERS

The second major area of work in which the Psychology Section is engaged is the evaluation of existing gunnery trainers and the development of new synthetic fire control and missile control training instruments. The Section will confine itself to trainers for seaborne fire and missile control instruments since the Human Engineering Section of the Special Devices Center is charged with the evaluation of all other types of Navy trainers.

The U. S. Navy spent several millions of dollars on training devices during World War II. In many cases these devices were not validated before going into production. It is at least possible that many of these instruments were worthless as trainers and, conceivably, some may actually have taught incorrect habits so that the subsequent learning of the proper habits was more difficult than it would have been if the trainer had not been used. Fully realizing the seriousness of this situation, the Bureau of Ordnance has requested the Psychology Section to undertake evaluative studies on all of the gunnery trainers under the bureau's cognizance and to attempt to improve them if this is found necessary. This bureau has also requested that the Section develop additional gunnery trainers to accompany the newer fire and missile control systems.

Trainer Design

A number of different purposes may be served by instruments called trainers. A trainer may be used in the following ways: (1) for the purpose of demonstrating a complex task; (2) as a device for improving skill; (3) as a practice instrument to maintain skill once it has been acquired; and (4) as a selecting instrument.

Unfortunately, it is not recognized by many of the engineers who design trainers that each of these four trainer uses requires instruments of slightly different design. Rather, it is assumed that devices built for one of the purposes can be used as effectively for others. This assumption is certainly not always true. In fact, it is only in the most exceptional cases that an instrument which has been designed as, say, a demonstrator will at the same time be valid as a

selection device or as an instrument for building up or maintaining skill. This is a result of the fact that different psychological requisites underlie the four trainer uses.

A gunnery trainer intended for use as a demonstrator would be expected to present highly realistic target courses and deliver a "realistic" score (on the average, two per cent hits for skilled trackers). On the other hand, a trainer intended for developing skill would have courses of varied difficulty and would have its scoring system so adjusted that the scores would differentiate between skilled and unskilled trackers. Such an adjustment would result in scores far higher than the "realistic" scores of the demonstrator. If instead of demonstration or skill building, the purpose of the trainer is to maintain tracking skill once developed, it will have to present many more target courses than the demonstrator (to prevent memorization over long periods of time), and the courses themselves will have to represent a high level of difficulty. Finally, if the trainer is to be used as a selection instrument, the scores must be so adjusted and the courses so chosen that the trainer discriminates between those of high and low tracking ability at an early stage of learning.

This example should make it apparent that the characteristics of a trainer must reflect the purpose for which it is designed. If it is desired to satisfy several purposes with the same instrument, the trainer must become, in effect, several trainers within one. Course cams and scoring circuits appropriate to each purpose must be built into the trainer in such a way that the throwing of a switch will energize whichever mechanism is desired. Though such a multiple-purpose trainer will, of necessity, be more complex than a trainer built for a single use, it will probably not always be necessary to have completely different course-generating and scoring systems for each of the four uses. It is quite likely that appropriate combinations of courses and scoring tolerances will serve in more than one capacity, though evidence on this matter must come from future validation studies.

It is one of the Section's most important duties to educate design engineers as to the proper design and use of synthetic fire and missile control trainers. This education is done in part through consultation and report writing but more effectively through

actually assisting the engineers in designing and constructing new trainers and redesigning existing trainers to enhance their usefulness. At the present time two Bureau of Ordnance trainers are under test and one trainer designed and built by the Section is in the process of being manufactured.

In addition to synthetic trainers the Section takes part in the design of other fire control training devices. Simple instruments which may be carried and used aboard ship for the purpose of improving the firecontrolman's skill with his equipment are particularly useful. Under this category fall visual and photographic check sights and automatic scoring devices. The Section has designed a photographic check sight to be used in evaluating the tracker's performance with a new type director. A device which automatically scores the performance of a pointer when he is tracking the radar image of a target has also been constructed. This last instrument delivers clock scores which represent time "on target" in relation to total tracking time. The scoring mechanism permits the scoring diameter to be varied from 5 to 20 mils in four equal steps.

Trainer Evaluation

The problems of trainer evaluation are well known to those who have worked with these instruments during wartime. All final validations must be conducted with several groups of subjects working over a period of many days. The investment in men, money, and materiel in full-scale validation studies is so great as to be almost prohibitive. Shortcut methods must be discovered and put to use before much of this most necessary work can be accomplished. To this end the Psychology Section is collaborating with others at the Naval Research Laboratory on the design and construction of a complex "blind-target" simulating device which will serve to simplify and speed up the work of gunnery trainer validation.

Fortunately, it is sometimes possible to learn a great deal about a trainer without performing a final validation test. Checks on the reliability of the scoring system, the realism of the courses, the simplicity of maintenance, the shape of the learning curves obtained by subjects using the device, and many other related items can sometimes serve to indicate the general usefulness of a trainer. Though such tests are not substitutes for validation studies,

a trainer which fails on several of the checks can probably be considered as having relatively little value in a military training program.

Members of the Psychology Section are in the process of making pre-validation checks on two Bureau of Ordnance trainers. Suggestions previously made have already resulted in changes being introduced into two other fire control trainers.

Training Research

Besides work on the design and evaluation of specific fire control trainers and training aids, the Section conducts research on fundamental principles of trainer design. Equipment is now being assembled to test the effect of "knowledge of results" upon the speed of learning to track simulated targets. Tests will be run on naive subjects to determine the rate and extent of improvement when (1) no scores are given, (2) earned tracking scores are presented at the end of every run, (3) earned tracking scores are presented at the end of a daily test period, (4) graduated fictitiously high scores are presented after each run, (5) graduated fictitiously low scores are presented after each run.

Another study is being arranged to test the training efficacy of a buzzer indication of "on target" as compared with no buzzer signal and with a buzzer signal to indicate "off target". Other studies are also contemplated to determine learning rate as affected by the difficulty of practice courses and the nature of the instructions.

BASIC RESEARCH

One of the prime functions of a group such as the Psychology Section is the acquisition of fundamental psychological information which may be of value to psychology in the future. Such basic research is necessary in order to furnish the knowledge which subsequently may be drawn upon for specific application. A second reason for encouraging basic research at an applied psychological research laboratory is to provide the members of the research organization with the opportunity for unrestricted research and publication.

At present, all basic research studies are aimed at the eye-hand coordination problem involved in target tracking. Two fundamental questions concerning tracking relate to why trackers make errors and how, when errors are made, they are corrected.

Starting out to answer the second question first, a simple pencil-tracking instrument was devised to allow an analysis of the correction movement made when "errors" were suddenly introduced. The results of several different experiments with this apparatus show that the rate of the correction movement increases with the size of the "error" to be corrected, though the actual proportion varies with different subjects. This means that subjects tend toward a constant correction time regardless of the size of the corrections made.

This increase of rate with distance is known to hold under the following conditions:

- (1) When tracking is done with either the right or left hand.
- (2) When the direction of the correction is either horizontal (to the left or to the right) or vertical (up or down).
- (3) When the ratio between hand motion and the motion of the pencil is either 1:1 or 3:1.
- (4) When the "error" which is corrected is either

"preset" or is an actual tracking error made by the subject.

It is also known that increasing the inertia of the tracking pointer results in a less pronounced increase of rate with size of error.

In addition to the analysis of error correction, equipment has recently been completed to allow studies of continuous tracking. Through the use of this device it is hoped that some insight may be gained into the reasons why subjects make tracking errors. This will involve a study of the magnitude and frequency of tracking deviations as they relate to target speed and course, nature of "set," type of control and numerous other variables. In this research freedom will be maintained to attack any aspect of continuous tracking which seems profitable, regardless of its military implications.

It is fully expected that the basic research will not long be confined to eye-hand coordination related to tracking. The Section is free to institute research in any area of experimental psychology and it is anticipated that studies in the field of perception will be the next to be undertaken.

PSYCHOLOGICAL RESEARCH ON EQUIPMENT DESIGN IN THE AAF

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RESEARCH MISSION

THE designing of all forms of equipment is generally considered to be a purely engineering function. But most of the tremendous variety of articles designed by engineers, be they industrial machinery, household appliances or children's toys, are intended for use or operation by human beings. It is apparent that the utility or success of such equipment must be, at least in part, dependent upon the degree to which it is suited to the psychological characteristics of the human beings who must use it. Up to the present time psychological data and research techniques have played an insignificant role in the field of equipment design. Relatively little data from the existing body of psychological fact can be applied directly to the problems of engineers. Current trends, stimulated by the war, indicate that psychological research on equipment design will become an increasingly important field of psychology, and will produce results of considerable practical and social significance.

Particularly in the field of aviation has the importance of human requirements in equipment design come to be recognized. There probably is no other engineering field in which the penalties for failure to suit the equipment to human requirements are so great. With present equipment, flying is so difficult that many individuals cannot learn to pilot an aircraft safely, and even with careful selection and extensive training of pilots, human errors account for a major proportion of aircraft accidents. The point has been reached where addition of new instruments and devices to those already present on the cockpit instrument panel actually tends to decrease the over-all effectiveness of the pilot by increasing the complexity of a task that already is near the threshold of human ability. As aircraft become more complex and attain higher speeds, the necessity for designing the machine to

suit the inherent characteristics of the human operators becomes increasingly apparent.

Several groups of psychologists carried on psychological research on aviation equipment design problems during the war. The Applied Psychology Unit at Cambridge University reported studies of psychological requirements in aviation equipment design as early as 1940 (2). The aviation research program at Cambridge was sponsored by the Medical Directorate of the Royal Air Force and the Flying Personnel Research Committee. The German Air Force carried on psychological research on equipment design, but was later than the British in initiating work on this problem (3). In the United States aviation psychologists were first asked to assist in an equipment design problem in the fall of 1943 when a joint Army-Navy-British committee on aircraft standardization was attempting to reach agreement on the cockpit arrangement of six basic flight instruments. John G. Jenkins and E. Lowell Kelly for the Navy, and Paul M. Fitts for the AAF served as the psychological consultants to the committee. William McGehee, who was then on duty at the Naval Instrument Flying School in Atlanta carried out an experimental study in which the eye movements of pilots were recorded while they were flying with two different instrument arrangements (10). In 1944 the Department of Psychology, AAF School of Aviation Medicine, initiated a series of studies of design factors influencing the legibility of instruments (5, 6, 7, 8, 9) and studies of the desirability of using distinctive shapes for aircraft control knobs (12, 13). The Special Devices Division in the U. S. Navy and the Naval Medical Research Institute also carried on studies of human factors in aviation equipment design. The Crash Injury Conferences sponsored by the NRC Committee on Aviation Medicine (11) and the Cornell University Project

sponsored by the same committee did much to stimulate interest in designing the cockpit around human requirements. In 1944 the Army Air Forces requested the Applied Psychology Panel of NDRC to undertake a study of psychological factors in the design of flexible gunnery equipment. The University of Wisconsin was given the contract for this project. Most of the research was carried out at Laredo Army Air Field (4). On 1 July 1945 the AAF established a new branch of the Aero Medical Laboratory at Wright Field, with the mission of conducting psychological research on equipment design problems of interest to the AAF. This unit is now a part of the peacetime AAF Aviation Psychology Program.

ORGANIZATION OF THE PSYCHOLOGY BRANCH

The location of the Psychology Branch at Wright Field is especially advantageous for equipment design research. The headquarters for the Air Materiel Command is at Wright Field. This Command is responsible for the development and procurement of all equipment peculiar to the needs of the Army Air Forces. The Aero Medical Laboratory is one of 14 laboratories in the Engineering Division of the Command. Its unique responsibility is consideration of the human element in equipment design. Since 1935 the scientists in this laboratory, including biologists, biophysicists, physiologists, physicians, anthropologists, and engineers have worked on such problems as oxygen equipment and pressurized cabins for high altitude flight; effects of "G" on the individual and methods of counteracting it; body size requirements for clothing, seats, escape hatches and turrets; pilot comfort; and escape from aircraft in flight. Among the many advantages of the Wright Field location are close association with other biological scientists and with the engineers who are responsible for design and procurement of new airplanes and other aviation equipment. Location in the Aero Medical Laboratory also makes it possible to keep together in one branch all psychologists who are working on engineering problems, and permits the staff to devote a major portion of time to basic research on problems of interest to the entire Engineering Division.

The scope of responsibility of the Psychology Branch covers all types of equipment used by the AAF. The branch is officially charged with "psychological research to determine the capacities of

individuals to operate new types of equipment as an aid in the designing of such equipment to the end that the final project will be best adapted to the man who must use it."

The branch is organized into three units in terms of the type of equipment problems studied. One unit specializes in cockpit display and control problems; one in psychological problems in design of radar, navigation, communication, gunnery, bombing and pilotless aircraft equipment; and one specializes in flight testing. This organization facilitates close liaison with other Wright Field laboratories and encourages staff members to learn as much as they can about the kinds of equipment with which they are working. The branch also is organized informally along conventional psychological lines of interest and specialization, such as perceptual problems, motor abilities problems, statistical problems and job analysis problems. This specialization makes it possible for men with similar interests to work together on psychological problems that are common to many different items of equipment.

RESEARCH PROBLEMS

The program of research that has been planned can be outlined systematically under a few broad headings. In order to illustrate problems in these areas, and to indicate some of the present activities of the Psychology Branch, current projects are used as examples of research in each area.

Control Problems

In the operation of any machine, some kind of control device is required. The characteristics that are desired in this control depend upon the function which it is designed to perform. A quick, all-or-none movement or a slow precise control may be required. At other times smoothness or exact timing of control movement may be an important requirement. Each such requirement may necessitate the design of a different type of control.

The design of a control can be varied in numerous ways. Many of these possible designs are equally feasible from an engineering point of view. One of the first problems for psychological research should be determination of the most important design variables in relation to the effectiveness of operation. Such variables as the following have been selected for early study: placement of the

control with relation to the body, especially with relation to the eye point; extent of movement required and muscle groups used in this movement; direction and kind of movement involved; amount of pressure or force required; and rate of movement. Problems arise, of course, involving the interaction of several or all of these variables. Also there are questions relating to the operation of several sets of controls concurrently, and the control of several dimensions of motion at the same time.

A problem which is now under investigation by the Psychology Branch is the accuracy with which pressure can be applied to a control, as a function of the absolute amount of pressure applied and the direction of application. The answer to this problem is particularly pertinent to the design of controls in new airplanes where it is possible, through the use of booster systems, to give the pilot almost any range of pressures ("feel of the controls") that is desired. The problem has been studied first in the laboratory by means of a psychophysical technique for measuring the variability of pilots and non-pilots in producing specified pressures on conventional type foot and hand controls. Later it is planned to determine how skill in a coordination task is related to the control pressures employed.

Display Problems

In the design of most machines provision must be made to supply the operator with precise information regarding the condition of the equipment he is controlling and with other related data. As in the case of controls, the design requirements for a display system vary with the task which the operator must perform. The design of displays is in many respects a psychological problem, involving the selection of the sense modality and the specific cues to be employed in providing the operator with information which he cannot perceive by his unaided senses.

A requirement that is common to almost all displays is that of providing for accurate perception. Print must be legible, dials must be capable of being read accurately, auditory signals must be clearly distinguishable, and images on a radar scope must be sufficiently sharp for recognition. Size, intensity, contrast and other variables should be studied in relation to the conditions under which the equipment is used, such as vibration, background noise, and high speeds.

It is important also that the meaning of a display be apparent immediately, in order that the operator can react rapidly and correctly while engaged in highly complex activities. In general it is believed that interpretation of an indicator should be in harmony with well established habits of perceiving. For example, it has been shown that errors in reading a particular navigation plotter are due to the fact that the scale increases from right to left, instead of from left to right, which is the conventional practice. In many cases it is important to determine what type of display is most natural or "expected" for untrained subjects. It is particularly important that the basic flight instruments used by the pilot indicate the attitude and position of the airplane in three-dimensional space, and the rates of change of these conditions in the most easily comprehended manner. An interesting psychological problem in this connection is the three-way relationship in the directions of movement of the instruments, the airplane, and the controls used for operating the airplane. It is important that these interrelationships conform to the most natural human perceptual habit patterns. The Gestalt principles pertaining to figure and ground have some application to this problem.

A further important display problem is the determination of the best sense modality through which to present different kinds of quantitative information. This question has arisen in connection with the design of warning devices, the transmission of blind landing information, the interpretation of radar returns, and many other problems. There are further problems of the best colors, tones, intensities, etc., for different displays and the best methods for representing a large number of separate conditions simultaneously.

An example of research on a display problem is a current study being made of the relative desirability of presenting numerical information in tables or in graphs. The Psychology Branch was asked whether men could obtain data more quickly and accurately from graphs or from tables. In order to answer this question several functions were represented as graphs, and the same functions were given in tables. Subjects were required to work the same problems with both types of materials and results were analyzed for speed and accuracy scores. Further comparisons are being made of systematic variations in the graphs and tables themselves. Results thus

far obtained have been very conclusive and it is evident that definite answers can be given to many practical questions involving the choice of graphs or tables for presenting data (1).

Study of Human Limitations

Regardless of how carefully equipment is designed, there always will be human limitations to its use. This is particularly true in aviation, where higher speeds, heavier loads, longer range and increasing complexity of modern aircraft are placing increasingly greater demands on the crew members. Human limitations must be studied in order to determine whether personnel can learn to operate proposed new items of equipment. Because of safety considerations the problem of human capacity usually requires the study of very unfavorable or exacting conditions, and emphasis on the extreme ranges of individual variability. An important problem in this area is the change in operator effectiveness after 6 to 12 hours of continuous work. Many flying duties, such as those of a pilot on a long mission, require the performance of arduous and exacting skills at the end of long periods in the air. It is not sufficient to know that a pilot feels fatigued after a long mission. Precise information is needed on the degree to which specific skills are impaired.

Other problems include such questions as the amount of time required for a man to accomplish a specified control operation, to read a series of instruments, or to transmit directions. The effects of unfavorable environmental conditions, such as extremes of heat and cold, on ability to carry out flying skills should be studied. The study of vision during very high speed flight near the ground is another problem requiring study.

A specific example of research in this area is a study which has been undertaken by the Psychology Branch to determine the effects of moderate amounts of "G", below the blacking-out threshold, upon the performance of skilled movements and upon perceptual processes. Simple tests that can be administered in one or two minutes are being used under several conditions of acceleration in the human centrifuge. Results will be of value in designing equipment and devising flying tactics for pilots of high speed planes. The findings also will provide general information regarding the effects of reduced cerebral circulation on perceptual motor processes.

Systems Engineering Problems

Aircrew members have to use many different instruments and controls. The arrangement of this equipment for effective human use is the problem of systems engineering. It is an area of engineering in which the psychologist can offer valuable assistance.

With working space in an airplane at a premium one of the most frequent problems in systems engineering is the location of a great deal of complex equipment so that the operator can use all of it effectively without getting up from his seat. Frequently several men must work as a team, and in this case it is necessary to decide where each man will work, what equipment he will use, and how each man's duties will be integrated with those of the others.

Although systems engineering problems often do not lend themselves as readily to basic systematic research as do the problems in the preceding three fields, they cannot be neglected. Together with consulting service and the study of prototypes of specific items of equipment, assistance on systems engineering problems is the phase of psychological engineering which leads most quickly to important practical results.

At present the Psychology Branch is cooperating in the solution of systems engineering problems for several new airplanes. The first models of some of these planes will not fly for several years, and much of the equipment to go into them has not even been built. The division of duties between crew members, and even the number of men required for certain operations, is still to be decided. It is during this design stage, however, that consideration of psychological requirements is most important if new high speed planes are to be built so that they can be operated safely and effectively.

IMPLEMENTING THE RESEARCH PROGRAM

Because psychological research on equipment design problems is such a new field it will be of interest to review the principles that have been followed and the points of view that have governed in the choice of problems and methodology. Policies are still evolving, of course, as new problems are encountered.

It is possible to undertake research on problems representing three levels of generality: (1) specific questions about particular items of equipment, as

for example, comparison of tracking accuracy with two different gun-sight hand grips; (2) psychological problems common to many different items of equipment, as, for example, determination of the best relationship between direction of movement of controls and related instrument displays; and (3) broad psychological questions requiring systematic study to determine basic principles of behavior, as, for example, study of human motor abilities. Only a few specific studies of the first type have been initiated. Major emphasis is being given at present to the second type of problem, in order to insure extensive application of the limited amount of research that it is possible to undertake. It is planned to carry on also some systematic basic research on such topics as the nature of human motor abilities, or the nature of orientation ability. In the long run, these basic studies should lead to the greatest number of important practical applications. Staff members are encouraged to design experimental studies in such a way that findings of broad general significance are likely to result.

Data on equipment design problems can be gathered in the air, in the laboratory, and in the field where flying activities are in progress. The majority of work by staff members is done in the laboratory. However, one transport-type plane (C-45) is being used full time in a flight testing program. The flight program will parallel the laboratory research and will make it possible to verify the applicability of laboratory results to the flying situation. In addition to research carried on in the laboratory and in the air, periodic visits are made to flying fields, and information collected from experienced flying personnel and from other available sources.

The majority of staff time is devoted to research. All staff members, however, devote some time to conferences and to work with engineers where immediate practical decisions must be made. As more and more data are accumulated in the areas of psychological engineering, this consulting service should become much more effective.

A major problem in implementing research on equipment design has been the development of research apparatus. Many design problems can be answered in a matter of days once the necessary equipment is available for testing subjects. Facilities for developing apparatus include the Psychology Branch shop, the Aero Medical Laboratory machine

shop, drafting and photographic departments, and the developmental engineering shops of the Engineering Division. Specialists in all branches of engineering, electronics, and instrumentation are available for consultation. It has also been possible to contract with commercial concerns for the development and manufacture of apparatus for use in the laboratory and in the air.

It is expected that all of the research projects undertaken by the branch can be given an open classification. It will be possible therefore for staff members to publish research findings in professional journals. It is believed that most of these research studies will be of general value to psychology as a whole.

RELATION TO OTHER RESEARCH AGENCIES

The Psychology Branch of the Aero Medical Laboratory, as a part of the post-war AAF Aviation Psychology Program, works in cooperation with psychology units in other commands. Equipment design is closely related to research on selection and training. The Wright Field unit, on the one hand, will be able to furnish advance information on new selection and training problems arising from the introduction of new airplanes and equipment. On the other hand, other units will furnish data on human aptitudes and training problems which will be of great assistance in guiding equipment design research. Coordination between the various psychological activities in the AAF is maintained through the psychology staff in the office of the Air Surgeon.

It is planned, also, to work closely with the psychological units in the U. S. Navy, including the Psychological Section of the Naval Research Laboratory, the Human Engineering Section of the Special Devices Division, and the Naval Medical Research Institute.

Now that most psychologists who served with the armed services or with government agencies during the war have returned to universities, it is considered particularly desirable to provide for interchange of information between university and government research groups, and to encourage individuals interested in aviation and related research problems to continue work in this field.

The Air Materiel Command has contracted with a number of universities for research on psychological aspects of equipment design problems. These

contracts run for one or two years. Some contracts provide funds for staff, equipment, and subjects. Others provide only an official basis for liaison. It is the policy in such contracts to give the university a great deal of freedom in planning research and to encourage systematic and fundamental studies. Problems for which contracts have been negotiated include the following:

(1) Determination of factors related to effectiveness of warning devices.

(2) Research on psychological factors affecting accuracy and speed of reading and interpreting scales, graphs, dials, and tables.

(3) Research on psychological principles in the design of controls for computing gun sights.

(4) Legibility of verbal and numerical information used in aircraft.

(5) Psychological study of flight controls, with special reference to requirements for prone position operation.

(6) Research on psychological aspects of orientation as they relate to the design of aviation equipment.

(7) Determination of the accuracy of reading aircraft type dials varying in diameter and angular spacing of the scale divisions.

The Air Materiel Command has opened a center for graduate study which offers on-the-job graduate training in engineering and related specialties at Wright Field. The center is operated through contract with a university and all courses carry university residence credit. The center for graduate study is provided with unique research facilities and training opportunities since all Wright Field research equipment is to be made available for training purposes. Men may be enrolled in a two year course of study leading to the M. A. degree or a four and a half year course leading to the Ph.D. Students go to class half time during working hours and half time after work. It has been agreed that psychology should be included among the courses of study offered by the center, and arrangements are being made for accomplishing this. This proposed curriculum in psychology would emphasize equipment design research problems and training in general experimental psychology. In addition to this training program for regular employees of the branch, plans are being made to employ several graduate students from universities on an internship basis and to permit them to carry out research

for their dissertations on problems in the field of equipment design.

The Aero Medical Laboratory is interested in encouraging research on equipment design problems and will offer whatever assistance is possible to individuals or departments planning research projects in this field.

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TESTS USED IN VETERANS ADMINISTRATION ADVISEMENT UNITS

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A SURVEY of the various psychological tests and diagnostic procedures used in the Veterans AdviseMENT Units is provided by the results of a questionnaire received from 188 units. Cooperation in replying to the questionnaire was very gratifying and directors of many of the units indicated not only that they would like to receive a copy of the results but commended the survey. A questionnaire was sent on July 1, 1946 to all such adviseMENT units then in operation, asking the director of each unit to indicate which tests were most useful in the counseling and guidance work with veterans.

The questionnaire listed 52 tests and diagnostic instruments selected by the authors (see Table I), with the following instructions: "For the following list of tests place an A in the () if you use the test *frequently*, i.e., at least once for each 5 or 6 veterans interviewed; a B if it is used *often*, i.e., at least once for each 10 to 20 veterans; a C if used only *rarely*; and a D if you have not used it at all." By these instructions the attempt was made to define accurately the words *frequently*, *often* and *rarely*. Blank spaces were also provided on the questionnaire and the directors of the units were asked to list such tests in use at their centers which did not appear on our questionnaire. This instruction produced a rather lengthy list of additional tests—more than 200.

The average case load per week was also asked in the questionnaire and, during the summer of 1946, it was 42 veterans a week per unit.

The questionnaires of 175 of the 188 units were in satisfactory condition for the analysis summarized here. Of the 13 not used, 5 had checked tests without any indication of frequency; 3 did not check any test because their units were not yet in operation; and the remaining 5 evidently misunderstood the directions.

An examination of the results in Table I indicates

that the tests used most frequently (at least once for each 5 or 6 veterans) were (1) the Kuder Preference Record (85%); (2) the Bennett Mechanical Comprehension (64%); (3) The American Council on Education Psychological Examination (54%); and (4) the Minnesota Clerical Aptitude Test (39%). From the point of view of usage, irrespective of frequency, the seventh column of Table I gives the percentage of such use, i.e., A, B, and C frequency are combined. The Kuder Preference Record had some use in 99% of the units replying; the Minnesota Clerical, 92%; the Bennett and the Minnesota Paper Form Board, 90%; the ACE Psychological Examination, 87%; the Wechsler Bellevue, 85%; the Purdue Peg Board, 79%; the Minnesota Multiphasic Personality Inventory, 77%; the Ohio State Psychological Examination and the Minnesota Rate of Manipulation Test, 75%; and the Strong Vocational Interest Inventory, 70%.

The test least frequently used was the Bulova Watch Test (only 3%), probably because of the unit directors unfamiliarity with this recent test. This is borne out by a number of inquiries received asking about the test and where it might be obtained. Only 5% of the units were using the Carnegie Achievement Tests, probably again because of general unfamiliarity with these tests. Widely known, but infrequently used, tests were the Stanford Binet, the Murray Thematic Apperception Test, and the Rorschach. The infrequent use of these instruments undoubtedly arises from their time-consuming and individual nature, rather than from a lack of appreciation of their value.

Tests reported as having some use in at least 10 guidance centers, and not included in our original questionnaire of the 52 tests, are summarized in Table II. The Otis Gamma, for example, was reported as *frequently* used in 35 centers; used *often* in another 9; and used *rarely* in another 5. The O'Con-

TABLE I

Frequency with Which Tests on Check-list Are Used by 175 V.A. Advisement Units Replying to Questionnaire

A—use the test frequently—at least once for each 5 or 6 Veterans; B—use the test often—at least once for each 10 to 20 Veterans; C—use the test only rarely; D—do not use the test at all.

	A		B		C		(A + B + C)	D		BLANK	
	N	%	N	%	N	%		N	%	N	%
<i>General</i>							%				
American Council on Education.....	95	54	34	20	23	13	87	14	8	9	5
Army Alpha.....	22	12	10	6	48	27	45	78	45	17	10
Army Beta (Revised).....	11	6	15	9	54	31	46	77	44	18	10
California Mental Maturity, Adv.....	29	17	15	9	57	32	58	57	32	17	10
Henmon-Nelson.....	11	6	10	6	27	15	27	100	57	27	15
Kent EGY.....	1	0.6	1	0.6	24	14	15	117	67	32	18
Ohio State.....	50	28	39	22	43	25	75	27	15	16	9
Otis Beta.....	51	29	34	19	27	15	63	45	26	18	10
Personnel (Wonderlic).....	5	3	5	3	18	10	16	114	65	33	19
Stanford Binet.....	0	0	7	4	44	25	29	94	54	30	17
Wechsler-Bellevue.....	36	20	52	30	58	33	83	15	9	14	8
<i>Manual and Mechanical</i>											
Bennett Mechanical.....	112	64	39	22	7	4	90	9	5	8	5
Bulova Watch Test.....	1	0.6	1	0.6	3	2	3	136	78	34	19
Macquarrie Mechanical Ability.....	14	8	41	23	62	35	66	43	25	15	9
Minnesota Mechanical Assembly.....	18	10	17	10	29	17	37	81	46	30	17
Minnesota Paper Form Board Rev.....	84	48	51	29	23	13	90	9	5	8	5
Minnesota Rate of Manipulation.....	36	20	61	35	36	20	75	24	14	18	10
Minnesota Spatial Relations.....	45	26	49	28	28	16	70	37	21	16	9
Pennsylvania Bi-Manual.....	23	13	23	13	33	19	45	65	38	31	17
Purdue Pegboard.....	62	35	47	27	30	17	79	22	13	14	8
<i>Special</i>											
Kwalwasser-Dykema.....	0	0	4	2	21	12	14	113	65	37	21
Lewerenz Art.....	1	0.6	14	8	33	19	28	94	54	33	19
McAdory Art.....	0	0	5	3	17	10	13	105	60	48	27
Meier Art Judgment.....	4	2	37	21	76	43	66	35	20	23	13
Seashore Music.....	1	0.6	14	8	74	42	51	60	34	26	15
<i>Interest Inventories</i>											
Brainard Interest.....	5	3	5	3	20	11	17	104	60	41	23
Cleaton Vocational Interest.....	4	2	10	6	39	22	30	89	51	33	19
Kuder Preference Record.....	149	85	15	9	8	5	99	2	1	1	0.6
Lee Thorpe Vocational Interest.....	29	17	18	10	15	9	36	86	49	27	15
Strong Vocational Interest.....	48	27	31	18	43	25	70	35	20	18	10
<i>Achievement Tests</i>											
Carnegie IV-X—Mathematics.....	1	0.6	1	0.6	7	4	5	124	71	42	24
Carnegie VII—Mod. Soc.....	0	0	0	0	6	3	3	126	72	43	25
Carnegie—Pre-Engineering.....	0	0	6	3	5	3	6	122	70	42	24
Cooperative I Social Studies.....	16	9	27	15	42	24	48	64	37	26	15
Cooperative II Natural Science.....	18	10	23	13	43	25	48	64	37	27	15
Cooperative III Mathematics.....	20	11	27	15	42	24	50	60	34	26	15
Cooperative—English.....	22	13	14	8	38	21	48	61	35	30	17
Cooperative—French.....	0	0	1	0.6	23	13	14	113	65	38	21
Cooperative—Spanish.....	0	0	0	0	21	12	12	115	66	39	22

TABLE I (Continued)

	A		B		C		(A + B + C)	D		BLANK	
	N	%	N	%	N	%		N	%	N	%
<i>Clerical</i>							%				
General Clerical.....	7	4	18	10	20	11	25	98	56	32	19
Minnesota Clerical.....	69	39	60	34	32	19	92	6	3	8	5
NI IP Clerical.....	4	2	6	3	12	7	12	114	65	39	22
Thurstone Clerical.....	3	2	9	5	12	7	14	112	64	39	22
<i>Personality Inventories</i>											
Allport and Vernon.....	1	0.6	3	2	31	18	21	102	58	38	21
Bell.....	26	15	44	25	47	27	67	41	23	17	10
Bernreuter.....	28	16	30	17	58	33	66	42	24	17	10
Guilford Inventory.....	0	0	5	3	8	5	8	125	71	37	21
Minnesota Multi. Personality.....	29	17	44	25	62	35	77	26	15	14	8
P-S Experience Blank.....	1	0.6	3	2	5	3	6	128	73	38	21
<i>Projective Techniques</i>											
Murray Thematic Apperception.....	0	0	2	1	18	10	11	112	64	43	25
Rorschach.....	0	0	4	2	29	17	19	103	59	39	22
Wechsler-Bellevue.....	13	7	24	14	55	31	52	41	23	42	24

nor Finger and Tweezer Dexterity Test was reported as having some use by 83 guidance centers, although 18 of them indicated that they used it rarely. Altogether there are about 25 tests reported in Table II. In addition, the directors of various guidance centers listed on the questionnaire another 175 tests (not reported here) which had some use in less than 10 centers: 23 were general intelligence tests; 20 were manual and mechanical tests; 7 were interest inventories; 85 were achievement and special aptitude tests; 19 were personality inventories; and the remaining 21 were tests of a special nature.

The data presented in Table III summarize the results of this survey from the point of view of the different categories of tests used. The following areas of psychological measurement or diagnosis were used at least once for each 5 or 6 veterans interviewed: 96.5% of the guidance centers employed at least one general intelligence test, 93% used an interest inventory, 83% used a manual or mechanical test, 50% used a personality test, and 43% used a clerical aptitude test. Only 6% used a projective technique for personality diagnosis. Practically all units used, at least some of the time, a test of general intelligence, a manual or mechanical test, an interest inventory, a clerical test, and a personality inventory.

An analysis of the results for the frequency with which tests are used, independent of the particular class or category of the test, reveals that 25% of the units replying used 10 or more of the 52 tests with an A frequency (at least once for each 5 or 6 veterans), and 25% used 4 or fewer tests with an A frequency; 25% of the units used 9 or more of the tests with a B frequency (once for each 10 to 20 veterans); 50% used 5 or fewer tests with a B frequency; and 25% used 4 or fewer with a B frequency.

Possible sectional differences were also considered in the analysis of the results. The sources of the questionnaires were divided into four geographical areas: the North Atlantic states, including Washington, D. C. (35 units replying); the Southern states including Texas on the west (46 units replying); the Middle Western group from Ohio to and including the Dakotas (59 units replying); and the Western group for those states west of Texas and the Dakotas (35 units replying). Some interesting differences were observed. For example, if the A, B, and C frequencies of usage are combined, the ACE was found to be most popular in the North Atlantic area (100%) and least popular in the South (70%); the Ohio State was most used in the West (94%) and least used in the South (50%); the Otis Beta was most used in the South (83%) and least used in the

TABLE II

Additional Tests Most Frequently Used by V.A. Units Replying to the Questionnaire

	FREQUENCY OF USE			TOTAL A + B + C
	A	B	C	
<i>General</i>				
California Capacity Questionnaire...	10	3	3	16
Otis Gamma.....	35	9	5	49
Otis Higher Examination.....	9	3	1	13
Otis Self Administering (Higher and Intermediate).....	17	4	1	22
<i>Manual and Mechanical Tests</i>				
California Survey of Spatial Relations	2	3	6	11
Crawford Tri-Dimensional Spatial Relations.....	7	10	7	24
O'Connor Finger Dexterity Test....	22	43	18	83
O'Connor Tweezer Dexterity Test..	20	45	18	83
O'Rourke Mechanical Aptitude Test.	13	19	8	40
Purdue Industrial and Training Classification Tests (I).....	0	6	9	15
Stenquist.....	1	8	7	16
<i>Interest Inventories</i>				
Cardall Primary Business Interests.	3	10	2	15
Thurstone Occupational Interest Schedule.....	1	2	8	11
<i>Achievement and Special Aptitude Tests</i>				
Engineering and Physical Science Aptitude.....	11	21	6	38
Iowa Aptitude and Training Chemistry.....	2	9	9	20
Iowa Aptitude and Training Physics.	2	7	6	15
Progressive Achievement.....	1	5	8	14
Stanford Achievement.....	3	4	11	18
Stanford Scientific Aptitude.....	3	3	15	21
USAFI-GED Tests (High School and College).....	20	15	23	61
Cardall Arithmetical Reasoning	1	3	6	10
Iowa Aptitude and Training Mathematics Test.....	3	11	8	22
<i>Clerical</i>				
Cardall-Gilbert Clerical Competence.....	3	2	7	12
Detroit Retail Selling Inventory....	1	7	6	14
O'Rourke Clerical Problems.....	3	3	5	11
<i>Personality Inventories</i>				
Adams-Lepley Personal Audit.....	5	7	12	24
California Test of Personality.....	10	11	18	39

Middle West (53%); the Army Alpha varied from 63% in the North Atlantic area to 32% in the Middle West; and the Wechsler Bellevue varied from 94%

in the North Atlantic area to 74% in the South. Considerable sectional differences in the use of projective techniques were observed. The West (63%) led in the clinical use of the Wechsler Bellevue as a projective technique, with the North Atlantic group 57%, the Middle West 49%, and the South 39%. The North Atlantic group led in the use of the Rorschach (34%), with the West 26%, the South 15%, and the Middle West 8.5%. Again, in the case of the Thematic Apperception Test, the North Atlantic group led with 17%, as compared with 13% for the South, and 8.5% for the West and Middle West.

Perhaps the most interesting implication of this survey lies in the diversity and variety of psychological tests employed by the various Veterans Administration Advisement Units throughout the United

TABLE III

Frequency of Use of the Eight General Types of Tests

CATEGORY	PER-CENTAGE WITH AT LEAST 1 A	PER-CENTAGE WITH AT LEAST 1 B BUT NO A	PER-CENTAGE WITH AT LEAST 1 C BUT WITH NO A OR B	TOTAL PER-CENTAGE USING TESTS IN THIS CATEGORY
General Intelligence ..	96.5	2.5	00.5	99.5
Manual and Mechanical.....	83.0	16.0	00.5	99.5
Special.....	6.0	37.0	40.0	83.0
Interest.....	93.0	6.5	00.0	99.5
Achievement.....	32.0	33.0	22.0	87.0
Clerical.....	43.0	41.0	14.0	98.0
Personality.....	50.0	28.0	20.0	98.0
Projective.....	6.0	16.0	33.0	55.0

States. At the same time, nearly all of the centers use tests to measure and diagnose the major dimensions of psychological abilities and aptitudes. It is also apparent that instruments and procedures that are more time consuming and that require considerable clinical experience and training for their administration and interpretation, such as the Rorschach for personality diagnosis, are infrequently used.

It is significant that the Veterans Administration did not attempt to set up a program of advisement which would require all centers to administer a standardized test battery, irrespective of the needs of each individual veteran. On the contrary, a program geared to the problems of the individual veteran has been encouraged. This is indeed a healthy sign for the development of psychological measurement and diagnosis on such a tremendous scale.

THE CALIBRATION OF TEST ITEMS

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THIS note is concerned with the calibration of test items as to difficulty so as to make it possible to produce successive editions of comparable examinations. This is a central problem for schools, test agencies, and Civil Service commissions who must prepare comparable examinations in successive years.

If several educational or psychological tests are to be assembled with some assurance that they be comparable in difficulty, the desirable procedure is to arrange a file of test items on each of which is recorded the difficulty rating. This rating can be expressed either in terms of proportion of correct answers for a given standardization group, or in terms of the corresponding sigma value on a scale which is arbitrarily so defined that the standardization group has a normal distribution. Successive editions of the test can then be prepared by selecting the same number of items at each difficulty level for each of the successive tests which are intended to be comparable. The correlations between the test items should of course be determined in a theoretically complete solution. In practice this is hair-splitting that is probably not worth the cost and effort, provided that each examination is long enough so that the average inter-item correlations can be considered comparable.

It is practically universal with the agencies that are concerned with successive editions of comparable tests that the initial file of items proves to be inadequate. If new items are to be added to such a test file one usually does not have access to the original standardization group. The question is then how to determine the difficulty ratings of the new test items so that they will be rated on the same basis as the items which are already in the file.

There are two policies which test agencies have adopted to solve this problem. One solution is to prepare one or two forms of an examination at rather high cost and to use the same examinations repeatedly. This requires that the examination

forms be carefully guarded so that they do not become public property. The policy then is to number the test blanks and to insure by elaborate formalities that every test blank is accounted for and returned. Any system in which an examination is used repeatedly is an invitation for the subjects to beat the game. It is the writer's belief that a much better policy is to assemble a different set of items for each examination. This is a question of policy on which the several agencies differ markedly. If each examination is to be a fresh assembly of test items then it is of course necessary to have a large file of test items so that no item will be repeated oftener than say every five or six years or more. We must then solve the practical problem of rating the new items which are being added to the test file so that all of the items will be rated as to difficulty on the same basis.

For many years we have used a simple method for solving this problem. When several hundred new items have been prepared, they are given to a new standardization group because the original group is no longer available for standardization purposes. In giving the several hundred new items, we interperse twenty of the old items whose difficulty rating was determined on the original standardization group. We refer to this list of twenty items as a linkage between the original standardization group and the new group. The difficulty ratings of the new items can then easily be determined for the new standardization group. The difficulty ratings of the linkage items are known for both groups. These items are selected so as to represent the entire range of difficulty.

There are two different ways of treating the data. Let us consider first the sigma ratings of difficulty. For example, a linkage item which was correctly answered by say 80 per cent of the original standardization group would have a difficult rating of $-.85$. If we plot the old sigma ratings against the new ratings for the twenty linkage items, we may expect a

linear plot if the old and the new standardization groups consisted of several hundred subjects. The slope of that line is the ratio of the standard deviations of the old and the new standardization groups. The intercept of that straight line shows the difference between the means of the two standardization groups. This is an application of the method of absolute scaling which the writer described some years ago (Thurstone, L. L., A method of scaling psychological and educational tests. *J. of Educ. Psychol.*, 1924, 7, 433-451). When this plot has been made, one can easily translate the difficulty rating of the new items from the new group of subjects to the old group of subjects. In other words, when we know the difficulty rating of an item for the new standardization group, we can estimate what it would have been if that item had been given to the original standardization group, in spite of the fact that the original group is no longer available.

Another procedure is merely to plot the one set of proportions against the other for the twenty linkage items. A continuous monotonic increasing curve can then be expected. This curve can be fitted by inspection, or more elaborately if one so desires. From this curve one can estimate for each of the new items what proportion of the original standardization group would have passed it if the new item had been included in the original standardization.

This procedure has been in use in our laboratory for many years although, as far as I am aware, it has not been published previously. Occasionally one finds a very interesting deviation from the continuous curve of proportions or from the straight line of sigma values. One of the twenty items may

be noticeably off the curve. This is likely to happen occasionally with material such as vocabulary items. On inspection we have found that such an item represents a word which might have been quite technical fifteen years ago but which has become well known because of recent events. The reverse can also happen but not so often. It would be incorrect to make a least squares fit by including such a deviant item. Such an item should be ignored. In dealing with vocabulary items or other types of material that are likely to change in difficulty because of current history, it may be preferable to use more than twenty linkage items. We have never found more than one deviating item in a set of twenty. In selecting the linkage items for standardization, it is best to inspect them with some editorial judgment as to whether they are likely to have been affected by current events. The old difficulty rating should of course then be revised and it should not be used as a linkage item.

The method of item calibration that has been described here is so simple that one can easily augment a test file to the desired number. When a sufficiently large file of test items becomes available, one can construct an indefinite series of comparable examinations with the same number of test items at each level of difficulty. This solution to the problem seems preferable to the policy of freezing an examination, keeping it secret so that it can be used in successive years. The availability of this simple solution to the problem of constructing parallel test forms may have a bearing on questions of policy with test agencies that hesitate to undertake the construction of new annual forms of their examinations.

Comment

IN DEFENSE OF MILITARY PSYCHOLOGY¹

A reply to Robert Tyson

In the January 1947 issue of THIS JOURNAL Tyson considers the field of military psychology and reaches several conclusions. I shall discuss each of them separately. First he says:

Writing by military personnel must be submitted for approval. Psychological articles were no exceptions to the rule that higher officers had to pass on material before publication. Since it is the consistent policy of the Armed Forces to present themselves in a good light, the sweetness and lack of criticism of war psychology becomes understandable. (Tyson, R. Footnote to military psychology. *Amer. Psychologist*, 1947, 2, 21-22.)

In so far as the Navy is concerned this represents a misstatement of fact. U. S. Navy Regulations, Article 113 states:

(2) Officers and other persons in the naval service desiring to publish articles on professional, political, or international subjects shall cause their signature to appear, together with a statement to the effect that the opinions or assertions contained therein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large. Immediately upon acceptance of such articles for publication, the writer will forward a complete copy thereof to the Secretary of the Navy for the files of the Navy Department.

Subject to the requirements of this and of paragraph (1) above,² officers and others in the naval service are at liberty to publish articles without further permission from higher authority.

Professional articles are ordinarily, but by no

¹ The opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

² Refers to paragraph 1, of Article 113 which governs military security only.

means routinely, submitted to the security officer before submission for publication, to avoid the possible publication of information on sizes of populations etc., which might be of use to foreign powers. There is not, however, any regulation or policy which requires the submission of any professional article to any Naval Authority before submission to the publisher.

Tyson goes on to say:

Psychology in the Armed Forces is science under an authoritarian regime. In the last analysis an authoritarian regime decides on the basis of seniority and rank. Ideas in the Armed Forces tend to bear the rank of their contributors and take precedence accordingly. Criticism in this atmosphere may be restrained.

This situation sometimes exists in the Armed Forces, but likewise frequently occurs in the working relationships of psychologists and others in industry, psychiatric hospitals, and if my memory of academic days serves me well, in universities.

Many military psychologists have pointed out in published articles that the training methods of the military services are far from perfect; the methods of assessing performance leave much to be desired; the placement of personnel many times is based on capricious circumstances. These are the types of criticism that are pertinent in professional articles. They are also the types of criticism found in articles concerning programs in industries and universities.

Tyson continues:

The ultimate judge of military psychology was usually not a psychologist. It was in the nature of wartime Armed Forces organizations that the highest authority rested with professional military men whose knowledge of psychology, with the very best of intentions, made it impossible for them to look beyond the attractive colored charts presented to them and inquire into the actual value of the psychological work they represented.

One who works in the applied field must invariably face this situation. Management personnel in industry, physicians in charge of mental hospitals,

presidents (and treasurers) of universities; are seldom psychologists. It is an accepted part of any applied psychologist's job to demonstrate the usefulness of his work to the sponsors of his program in such a way as to gain support. An outstanding example of the possibilities of doing so in the Armed Forces is illustrated in a situation (Flanagan, J. C. The experimental evaluation of a selection procedure, *Educ. and psychol. Meas.*, 1946, 6, 4.) where nonpsychological professional military men allowed the AAF Aviation Psychology Branch to place over 1,000 men in pilot training regardless of their performance on selection devices in order to obtain an uncontaminated validation sample. This, it seems to me, shows a high degree of insight by those in command into the problems of scientific method. Those who have attempted to obtain the same type of cooperation from their sponsors in nonmilitary situations have not always found the sponsor so understanding.

Tyson concludes with the statement:

It is submitted that the place for military psychologists is outside the Armed Forces, acting freely in an advisory capacity.

Those of us on active duty realize the extreme value of consultation with other psychologists. Provisions for the continued use of such consultation have been made. We believe, however, that advice from the outside on psychological problems is largely unproductive unless the Armed Forces have someone in the active organization who will actually implement these suggestions. Someone has to do the work.

An arrangement of the type Tyson suggests obtained following World War I. Only time can say whether the psychologists who serve on active duty during the period following World War II can accomplish at least one j.n.d. over and above the zero accomplishment in the interval after World War I.—

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NOTEHAND FOR PSYCHOLOGISTS

Psychologists and students of psychology spend much time making notes and composing letters and manuscripts. In nontechnical writing, the hundred most common English words constitute more than fifty per cent of all the words used (Dewey, M. *Notehand and Other Labor-Savers*. Pamphlet, revised.

Lake Placid Club, N. Y.: General Shorthand Corporation, 1942). In psychological writing, the same common words together with some four hundred others in their various forms constitute perhaps an even larger per cent of all the words used. These four hundred other words include many long and technical terms. By abbreviating most of the hundred common words and all of the four hundred other words, as in the system presented herewith, psychological writing is reduced, by actual measurement, about thirty per cent.

For most purposes, abbreviations are better than shorthand. Few persons working in psychology know shorthand; and any shorthand not written by an expert can be read only by the individual who wrote it and soon becomes "cold" even for him. Extant systems of speedwriting share the disadvantages of shorthand. Many a psychologist has developed a lot of abbreviations for himself; but such abbreviations are likely unique and so unsystematized that no one else can read them. What is needed is a system of abbreviations which can be learned easily and can be read by any one with a list or with a little practice.

The system presented in this paper was launched some thirty years ago. Most of the abbreviations of the common words came from Melvil Dewey's *100 Notehand Breves*. Except for a few special symbols, each of the five hundred abbreviations follows one or the other of Dewey's two main patterns, namely, to use either the first letter or letters, or the most characteristic letters, of the word abbreviated. Examples of the respective patterns are "sma" for "small," and "ltl" for "little." Unlike Dewey's system, however, in this one, except for the few special symbols, only actual letters of the words are used; the abbreviations of all nouns are capitalized; abbreviations of proper nouns are underlined; abbreviations of institutional structures and of blood kin are encircled; almost every abbreviation that spells a word is followed by a period; an apostrophe within an abbreviation stands for some important part of the original word; and every sentence begins, as in ordinary writing, with a capitalized and unabbreviated word. These several features make the system very easy to read.

Throughout the thirty years I have used the system constantly, both in making notes for myself and in drafting copy for others to read and type.

Some of these readers have been professional secretaries, but many have been student helpers. None of the readers had much trouble with the system, and each learned it quickly. Several of them suggested improvements which further readers have found satisfactory.

To avoid confusion, I have used the abbreviations only in writing by hand, never in typewriting. A few of the symbols, indeed, do not exist in type; they have to be written by hand.

Both for that reason and to save space, only the first 42 abbreviations are listed here. This sample portion of the list is followed by several examples which draw upon the complete list. The first example is abstracted from the opening paragraph of this paper. In actual use, "of" is represented by a check mark.

A mimeographed copy of the complete list will be mailed to any one who sends the approximate cost, 15¢ in stamps, to "15 Pierce Hall, Northampton, Mass."

abbrev	abbreviate	aft	after	Arg't	argument
Abbrev	abbreviation	ag	again	Cp. Arrgt	
Abdy	anybody	ali	alike	Arith	arithmetic
Cp. Ebdy		alim	aliment	Arrgt	arrangement
Nbdy		alr	already	Cp. Arg't	
Sbdy		alt	alternate	Art.	article
abn	abnormal	altho	although	Assn	association
Abstrn	abstraction	altr'ic	altruistic	assoc	associate
abt	about	Altr'm	altruism	Athg	anything
accd	accord	alw	always	Cp. Ethg	
acct	account	amt	amount	Nthg	
ack	acknowledge	anotr	another	Sthg	
acqt	acquaint	ans	answer	Attn	attention
adjt	adjust	approp	appropriate	Au	author
Adjt	adjustment	approx	approximate	auton	autonomic
Advge	advergence	arg	argue	av	average
Advge	advantage			b	be

"Psychologists spend mu T mkg notes & composg Ltrs & MSS. In nontech'l Writg, t 100 most common English Wds constitute mo tn 50% ✓ all t Wds used. In psy'l Writg, t sm common Wds togetr w sm 400 otrs in tr dif Fms constitute pphs an even la'r % ✓ all t Wds used. By abbrev'g, as in t Sys presented herew, psy'l Writg is reduced abt 30%."

"The terminology ✓ Psy is oft a source ✓ unnec Diff. Since we r to b studyg activities, our terms shd properly b verbs & adverbs. We shl need 1 noun, *Ind* or *O'sm*, as t Subj ✓ all t verbs. When we dip into Phys we need t names ✓ bodily O's, & wn we speak ✓ extl Obj's we need tr names. But t Rdr wl encounter a host ✓ otr nouns, names ✓ activities & ways ✓ Actg, su as Intel'ce, Pers'ty, Mem, Imag'n, Thot, Wl, Stn, Em, Attn, Pcptn, C, Behav. Most ✓ tse nouns r properly verbs w 'Ind' ustd as tr Subj."

"Various Au's in t last century & in ts hv thot tt mult Pers'ties r caused by Sug'n — Sug'n ei fr t Pt himsf, fr sm outside Pers, fr t Phy'n (esp'y if he hypn's t Pt), or fr mo tn 1 source. Apparently those Au's r ri- in part. Nevertheless, to ascribe mult Pers'ty to Sug'n in t abstract is to overlook mo esstl causes. Suggestion, to b effective, must find a rdy recipient; & recipients r made rdy var'ly by N & by special phys'l, psy'l, & envtal circumstances."

"As Francis Bacon said, 'Then o wl tr b gd ground ✓ hope f t furtr advance ✓ K, wn tr shl b rec'd & gatrd togetr into n'l Hist a Var ✓ Expts, which r ✓ no use in tmselves, bt simply serve to discover causes & axioms; which I call "*experimenta lucifera*," Expts ✓ Li-.'"

W. S. TAYLOR
Smith College

Across the Secretary's Desk

ACADEMIC ORIGINS OF APA FELLOWS

Which universities have given graduate training to the present Fellows of the APA? A tabulation of the Ph.D.-granting universities of the Fellows listed in the 1945 Yearbook of the APA, plus the Fellows of the AAAP who during 1945 transferred to that status in the APA, gives first place to Columbia University. Teachers College was included without distinguishing it from Columbia University because "Columbia University" is frequently named by people whose graduate work was done at Teachers College. The University of Chicago is in second place with slightly less than half as many as Columbia. Harvard and Iowa are in third and fourth places. The total percentage from each of ten leading universities is shown in the last column of Table 1.

Breaking the totals down by five-year periods shows a number of interesting trends in the rise and fall of a university's importance for psychology as measured by the number of APA Fellows it has trained. Columbia, the leader in totals, has been most consistent in its output. Between 16 and 25 per cent of the Fellows of the APA who received their Ph.D.'s in each five-year period since 1905 received them at Columbia.

Chicago, the second most productive school, earned that rank during the period from 1900 to 1919. During each of the four five-year periods in this span it granted between 13 and 15 per cent of the Ph.D.'s held by all present APA Fellows who earned their doctorates during those years. Since 1920 Chicago has declined steadily in terms of its contribution to the number of Fellows. Since 1935 it has trained only 5 per cent of the total.

Harvard, Clark, and Cornell have had similar histories. During the first 15 to 20 years of the century each gave Ph.D.'s to a sizable fraction of the total. Since then all three have been steadily losing ground.

Yale, Stanford, Iowa, Minnesota, and Ohio State have all grown in relative importance during the last two or three decades. Yale was one of the early-day leaders. From 1905 to 1924 it trained a consistently small number of present Fellows. Since 1925, how-

ever, it has risen steadily to climb into second place for the group receiving the degree since 1935.

The State University of Iowa has been an up-and-down producer of Ph.D.'s who have since become APA Fellows. It had peaks in 1910 to 1914 and again in 1925 to 1934.

Minnesota, Ohio State, and Stanford, starting

TABLE 1

For each five-year period, the percentage of the Fellows of the APA who received the Ph.D. from leading universities

UNIVERSITY	FIVE-YEAR PERIODS									Total period 1900- 1944
	1900 1904	1905 1909	1910 1914	1915 1919	1920 1924	1925 1929	1930 1934	1935* 1944		
Columbia.....	4	22	24	20	25	20	16	24	20	
Chicago.....	13	15	15	13	11	8	7	5	9	
Harvard.....	34	7	10	11	6	6	6	3	7	
Iowa.....	4	2	7	1	3	9	8	4	6	
Yale.....	8	2	2	2	1	5	7	12	5	
Clark.....	4	17	12	10	4	4	4	2	5	
Ohio State.....	0	0	0	2	2	6	8	5	5	
Stanford.....	0	0	0	3	5	5	5	4	4	
Cornell.....	4	2	10	3	6	2	1	1	3	
Minnesota.....	0	0	0	1	3	3	4	5	3	
All others.....	29	32	20	32	34	33	34	35	33	
Total.....	100	99	100	98	100	101	100	100	100	
Percentage of all APA Fellows re- ceiving Ph.D. in each period.....	3	5	7	10	14	22	23	15		

* A ten-year period is included in this column. The number of Fellows whose degrees were received in 1940 or later is not large enough to warrant a separate column. Including them here does not alter or distort any of the trends shown in the table.

from scratch about 1915, have each shown steady increases in the years since.

All other universities contributed approximately a third of the total in each five-year period.

Table 1 can be summarized in part by considering the four leading universities in each decade since 1900. The four universities contributing the largest number of Fellows who received the Ph.D. degree between 1900 and 1909 are Harvard (11), Columbia

(10), Chicago (9), and Clark (8). The same four schools lead in the next younger group, those who received the degree between 1910 and 1919, but with the schools ranked in different order and with larger differences separating them: Columbia (32), Chicago (21), Harvard (16), and Clark (16). In the group which received the Ph.D. between 1920 and 1929, Iowa replaced Clark in the top four and the differences between the ranks increased further in size: Columbia (70), Chicago (29), Iowa (22), and Harvard (18). Only Columbia of the original four remains among the leaders in training the Fellows who received the Ph.D. since 1930: Columbia (64), Yale (30), Ohio State (24), and Iowa (22).

Nearly half of the entire group received the Ph.D. during the 10 years 1925 to 1934. Those who received their degrees earlier got them at a time when Ph.D.'s in psychology were less common; they are also reaching an age of higher death rates. Those whose degrees were received in 1935 or later have progressed rather rapidly in attaining the status of Fellow. Hence they are not numerous (many others whose degrees date from 1935 or later will become Fellows in future years). This leaves the main group of Fellows coming from the decade 1925 to 1934.

There is a large difference in the frequency, or in the speed, with which graduates from the different schools advance to the status of APA Fellow. The number of Ph.D.'s in psychology granted from 1935 to 1940 (data from E. L. Smith, *Amer. J. Psychol.*, 1944, 57, 95) and the percentage from each school which had become APA Fellows by the end of 1945 are shown in Table 2. For all schools combined, about one person in five who received a Ph.D. in the years 1935 to 1940 inclusive had become a Fellow by the end of 1946. The records of Harvard and

three Midwestern schools, Chicago, Ohio State, and Minnesota, approximate this national average. Stanford, Clark, Yale, and Columbia Ph.D.'s did much better; those from Iowa and Cornell much worse. Why these large differences? Do some colleges select better graduate students who then advance more rapidly after completing their graduate training? Do some colleges train their graduates

TABLE 2

Number of Ph.D.'s granted from 1935 to 1940 by each university and the percentage from each who have become APA Fellows.

UNIVERSITY	NUMBER PH.D.'S IN PSYCHOLOGY, 1935-1940	NUMBER ELECTED FELLOWS OF APA BY END OF 1945	PERCENTAGE ELECTED FELLOWS OF APA BY END OF 1945
Columbia.....	86	31	36
Chicago.....	28	6	21
Harvard.....	21	4	19
Iowa.....	86	6	7
Yale.....	40	16	40
Clark.....	7	3	43
Ohio State.....	42	7	17
Stanford.....	11	6	55
Cornell.....	15	1	7
Minnesota.....	28	7	25
All others.....	319	46	11
Total.....	683	132	19

to specialize in the kind of activities which lead most easily to advancement in the APA and the AAAP? Or do some colleges actively stimulate and help their students to advance more rapidly than others? The colleges themselves can answer these questions easier than an outsider surveying the statistics. Whatever the answer, the differences are so large that it seems worthwhile for the universities to consider possible explanations of their own records.

DAEL WOLFLE

Psychological Notes and News

KURT LEWIN died February 12, 1947 at the age of fifty-six years. He was chairman of the Research Center for Group Dynamics of the Massachusetts Institute of Technology.

DONALD G. MARQUIS of the University of Michigan is directing a study in social sciences for the Carnegie Corporation. As part of his task he is currently engaged in surveying social science problems and methods.

FRED BROWN is now Chief Psychologist for Mount Sinai Hospital, New York, and lecturer in psychology at New York University. He entered the armed forces in 1943 and among his other duties organized the psychology department of the Shrivensham American University, England. During his last seven months overseas he toured the American Zone as lecturer for the I. and E. Lecture Bureau, USFET.

IRVING C. WHITTEMORE, formerly director of the Veterans Center of Boston University, has been appointed chairman of the psychology department at the College of Business Administration there.

THOMAS J. HAND has been appointed Chief, Re-training Service, at the VA Hospital, Sunmount, New York. He was previously rehabilitation counselor at the Saranac Lake Study and Craft Guild.

UDO UNDEUTSCH, Dozent of psychology at the newly opened University of Mainz, has written that ALBERT WELLEK is head of the Psychological Institute there. The university is housed in former antiaircraft barracks, and has a student population of 4,000 who were selected from some 10,000 applicants.

JOHN T. COWLES has returned as a civilian to the Aviation Psychology Program of the Army Air Forces, in which he served as an officer during the war. He is director of the Aviation Psychological Research Unit at Headquarters, Flying Division, Air Training Command, Randolph Field, Texas.

EDMUND G. WILLIAMSON, Dean of Students at the University of Minnesota, has returned from

Germany where he was a member of a fifteen-man commission which investigated and evaluated German war developments in scientific and personnel management, and industrial training.

JOHN E. PARTINGTON, formerly personnel consultant with the Adjutant General's Office, has been appointed personnel counselor in the Vocational Rehabilitation and Educational Division of the VA Regional Office, Roanoke, Virginia.

ROBERT M. W. TRAVERS has been appointed University Examiner in the Institute for Human Adjustment and associate professor in the School of Education at the University of Michigan. He was formerly the chairman of the department of psychology at Beloit College, Wisconsin. LESTER E. WILEY has accepted the appointment as chairman of the department and professor of psychology at Beloit.

CALVIN P. STONE has received a \$2400 grant for research on the effect of electro-convulsive shock therapy on the behavior of rats. His research assistants will be IRWIN KATZ, MILTON W. HOROWITZ, PAUL PORTER, and other graduate assistants in psychology.

KENNETH F. HERROLD is an instructor in the Division of Guidance, Teachers College, Columbia University. Formerly he was with the Michigan Child Guidance Institute.

MARION R. STOLL has accepted a position with the department of psychology at the University of Alabama, beginning with the spring quarter of 1947.

PHILIP WORCHEL is now assistant professor in the department of psychology at Tulane University.

H. H. REMMERS will be a visiting professor at the University of British Columbia, Vancouver, Canada, in the summer session of 1947. He will lecture on measurement and evaluation.

FRANCIS IRWIN, editor of the Journal of Experimental Psychology, has appointed the following

consulting editors: CLARENCE GRAHAM, HARRY HELSON, DONALD B. LINDSLEY, GEORGE A. MILLER, L. L. THURSTONE, G. R. WENDT, and JOSEPH ZUBIN.

The Metropolitan New York Association for Applied Psychology has elected the following officers: GEORGE LAWTON, president; GEORGE K. BENNETT, vice-president; and BLANCHE E. WEILL, secretary-treasurer. The members of the council are: KATHRYN MAXFIELD, WALLACE WULFECK, KATE LEWIS, and MYRTLE PIGNATELLI.

FREDERICK A. ZEHREER, formerly Director, School Division, Headquarters, First Service Command, is now lecturer on educational guidance at Harvard Graduate School of Education and personnel counselor in the VA Guidance Center there.

The University of Florida has expanded its department of psychology. The present staff includes: E. D. HINCKLEY, ROBERT P. FISCHER, GEORGE W. KISKER, DAVID K. SPELT, STAN E. WIMBERLY, R. J. ANDERSON, K. S. DAVENPORT, I. R. STONE, OSBORNE WILLIAMS, and JACK D. EMERSON.

The department of psychology of the University of Pittsburgh has added to its staff the following psychologists as part time lecturers in order to take care of increased teaching needs. Each of them lectures in the field of their specialization. They are: DORA CAPWELL and MAHLON V. TAYLOR of the Allegheny Vocational Counseling Center; CARROLL WHITMER and MARY ELWOOD of the Special Education Division, Pittsburgh Public Schools; SAUL ROSÉNZWEIG and ROBERT A. PATTON of the Western Psychiatric Institute; ROY M. HAMLIN and I. COBLENTZ of the Mental Hygiene Clinic of the VA; JOHN GORSUCH of the Carnegie-Illinois Steel Corporation; NETTIE LEDWITH of the Pittsburgh Child Guidance Center; JUSTIN HARLOW of the Behavior Clinic of the Allegheny County Criminal Court; THEODORE O. ELTERICH of the University of Pittsburgh Medical School; and Y. D. KOSKOFF of the Montefiore Hospital.

Shortly before his death, CHARLES S. MYERS prepared a bibliography of his publications. The National Institute of Industrial Psychology, Ald-

wych House, London W. C. 2, will send copies to any American universities which apply for them.

The San Francisco State College, 124 Buchanan Street, San Francisco, California has made several additions to its department of psychology. JOHN CORNEHLSSEN has been appointed associate professor and dean of men; BOYD R. McCANDLESS, assistant professor; and GEORGE SHEVIAKOV, lecturer. A VA Guidance Center will be set up there, with employment opportunities for at least two and possibly four other psychologists who will counsel half time and teach half time.

FORREST LEE DIMMICK, professor of psychology at Hobart and William Smith Colleges, has been granted a year's leave of absence to accept an appointment as psychological specialist in vision at the U. S. Naval Medical Research Laboratory, U. S. Naval Submarine Base, New London, Connecticut. During his absence CLAIRE C. DIMMICK will be acting head of the department, and ROBERT BURNHAM has been appointed as instructor.

W. J. BROGDEN, professor of psychology at the University of Wisconsin, has been appointed assistant dean of the Graduate School.

The Division of School Psychologists has appointed BERTHA M. LUCKEY chairman of the program committee, WILDA M. ROSEBROOK chairman of the membership committee, and MORRIS KRUGMAN chairman of the nominating committee.

The Undergraduate Division of the University of Illinois in Chicago has established a personnel bureau for students. Its function will be counseling, including test services as related to educational, vocational, and personal adjustment. The staff will include PAUL C. GREENE, assistant director in charge, WILLIAM F. THOMAS, clinical counselor, and HOWARD L. SIPLE, associate counselor.

The Psychological Guidance Center of Chicago, Illinois announces the addition of ROY BRENNER to its staff.

At the February meeting of the Illinois Association for Applied Psychology a symposium was held on "Training Programs and Problems in Clinical

Psychology." The speakers were GORDON V. ANDERSON, WILLIAM A. HUNT, JOHN P. SPIEGEL, and PHYLLIS WITTMAN.

In a recent letter F. J. ARNTZEN described the status of psychology in German universities at the end of 1946. During the war the buildings of the psychological institutes of Marburg and Muenster were destroyed and other institutes lost large parts of their libraries. Psychological periodicals had to cease publication and the printing of psychological books was limited to those approved by the government authorities. The state-sanctioned organization of all psychologists came to an end with the end of the war. The occupation of the different zones by the various allied powers has caused psychologists to migrate to other zones. Some psychologists were caught in the de-nazification process and had to give up teaching entirely.

The destroyed institutions have been housed in other buildings of the universities temporarily, but the publication of books and periodicals has been hindered by the difficulties of printing. Although the restoration of psychological societies has begun, the organization will probably take place only within the individual zones. In most universities teaching has been resumed sufficiently to allow students to prepare for the MA examination. ALLESCH is now teaching at Göttingen, DÜKER, at Marburg, HELLPACH at Heidelberg, LERSCH at Munich, METZGER at Münster, RÖSSEL at Hamburg, and SPRANGER and KRETSCHMER at Tübingen.

The contact of German psychologists with the research of other countries is still very inadequate because of the impossibility of obtaining scientific periodicals and books, and the restriction of mail and currency exchange.

In the announcement of internships at the Western State Psychiatric Institute and Clinic in the February issue of the AMERICAN PSYCHOLOGIST, mention of their arrangements with the University of Pittsburgh was omitted. The supervised clinical and research experience with mental patients may be counted as six semester credits and course work may be taken at the university to the extent of three credits a semester. If the intern wishes to continue as a graduate student at the university, it may be possible to arrange for beginning of the research for the thesis toward the latter part of the internship.

The Dartmouth Eye Institute has donated a set of demonstrations concerning the nature of experience to the Office of Public Opinion Research of the department of psychology at Princeton. It has also prepared a laboratory manual, *Some Demonstrations Concerned with the Origin and Nature of Our Sensations*, indicating the phenomena to be observed and their apparent explanation. The demonstrations will be used for teaching and research.

At the annual meeting of the Psychometric Society at Philadelphia in September 1946, it was moved to decline with thanks the invitation of the American Psychological Association to become a division of that association.

The second annual coordinating conference of the Western State Psychiatric Institute and Clinic, Pittsburgh, will be held on April 10 and 11. The theme this year will be the place of psychiatry in general medicine. The principal speaker at a dinner meeting the first night of the conference will be Dr. WINFRED OVERHOLSER, president-elect of the American Psychiatric Association. All professionally interested individuals are invited to attend.

The Bureau of Psychological Services of the Institute for Human Adjustment at the University of Michigan has begun a new program of counseling for the blind, working at the present time with blind persons referred to them by the State Department of Social Welfare. W. W. MORRIS is the chief psychologist for the Special Clinical Services in the Bureau and is in charge of this work.

Wartime research has led to the development of two new devices for the blind. One is the portable "audiograph" which makes possible the recording of class lectures. The other is an electronic pencil which is still in the experimental stage. It translates printed letters into sounds which can be interpreted by the blind person, making possible the reading of normal printed material.

The annual meeting of the American College Personnel Association will be held at the Deshler Wallick and Fort Hayes Hotels, Columbus, Ohio, in conjunction with the Council of Guidance and Personnel Associations, March 28 to 30. Digests of papers to be submitted for the consideration of the program committee should be sent to Wendell

Dysinger, Chairman. Hotel reservations should be made as soon as possible.

The Industrial Services Division, Department of Labor has prepared a booklet, *Industrial Films, a Source of Occupational Information*, which reviews 51 industrial films that present information about jobs in 18 industries. This publication describes the films and evaluates them, as well as including information on their distributors. The booklet is available for 20 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

Princeton University has started a program of systematic analysis of student development and educational procedures. The object of the project is the critical examination of residential university life, including both instructional programs and extracurricular activities, to determine their results as measured by the intellectual, moral, and physical development of students. The study, believed to be unique in the field of higher education, is made possible by a grant of \$200,000 from the Carnegie Corporation of New York. It is estimated that it will require at least five years to complete.

On November 22, 1946 the organization of the Georgia Psychological Association was formally completed, the constitution adopted, and officers for 1947 elected. HERMON W. MARTIN was elected president, ROBERT M. HUGHES, president-elect, J. E. MOORE, treasurer, and Mrs. R. C. TOPPER, secretary. EMILY S. DEXTER, SIDNEY JANUS, and LARRY ROSS were elected directors. The charter membership of the GPA consists of 27 members of the APA who are residents of Georgia, and several APA members from adjoining states.

GEORGE LAWTON is now offering a course in counseling for the older person at the New York University School of Education. The course is designed for those who wish to learn how to deal more effectively with the adjustment problems of older people.

The Department of Commerce has published a series on "Establishing and Operating Your Own Business" for counseling veterans and senior high school students. The specific titles can be obtained from the Commerce Department, Washington, D. C.

The School of Education of Syracuse University, in cooperation with the George Davis Bivin Foundation and the Psychological Services Center of Syracuse University, will sponsor a conference on mental hygiene and the problems of exceptional children on May 2 and 3.

The first national conference on counseling and guidance conducted by the National YMCA Committee on Placement and Guidance will be held at George Williams College Camp, Lake Geneva, Wisconsin, June 23 to 26. Among the topics on the program are group guidance and group work activities, training and professional growth of counselors, psychometric use and misuse, effective interviewing in the informal agency, implications of war work and recent research, and the utilization of community resources. The conference secretary is Robert R. Corley, 304 Wood Street, Pittsburgh, Pennsylvania.

The seventh annual meeting of the State Directors and Supervisors of Special Education was held March 3 in Atlantic City, New Jersey. Each state presented its plan for the solution of various educational problems.

A study of the question as to whether veterans make better college students than non-veterans is being made by the College Entrance Examination Board. It is supported by the Carnegie Foundation for the Advancement of Teaching and the Carnegie Corporation of New York. Approximately a dozen colleges and universities throughout the country will be invited to participate in the project. In order that the study may include students from as many different types of institutions as possible, the group will be chosen on a broad geographical basis and will include both large and small colleges as well as men's and co-educational institutions.

It is expected that the 4-year graduate training program leading to the doctorate in clinical psychology sponsored by the Veterans Administration in cooperation with the universities accredited in this field (described in the June, 1946 issue of THIS JOURNAL) will continue for several years. It is anticipated that there will be approximately 350 additional positions throughout the country available in September, 1947. Salaries sufficient for self-

support are paid by the Veterans Administration to accepted applicants. Veterans are given preference, but non-veterans may also apply. Both men and women are accepted. Further information may be obtained from the Chief, Clinical Psychology Section, Veterans Administration, Washington 25, D. C.

The Clinical Psychology Section, Neuropsychiatry Division, Veterans Administration, announces the following additional appointments in the clinical psychology program of the Veterans Administration (see AMERICAN PSYCHOLOGIST, September 1946, for previous list):

<i>Branch Chief Clinical Psychologist</i>	<i>Branch Office</i>
CHESTER C. BENNETT	# 1, Boston, Mass.
STARKE R. HATHAWAY	# 8, St. Paul, Minn.
JERRY W. CARTER, JR.	# 9, St. Louis, Mo.
HAROLD M. HILDRETH	# 12, San Francisco, Calif.

<i>Asst. Branch Chief Clinical Psychologist</i>	<i>Branch Office</i>
MAX COOPER	# 1, Boston, Mass.
N. NORTON SPRINGER	# 3, Philadelphia, Pa.
DONALD RAMSDELL	# 6, Columbus, Ohio
H. MAX HOUTCHENS	# 11, Seattle, Wash.
RUTH TOLMAN	# 12, San Francisco, Calif.

On Duty in Regional Offices—Mental Hygiene Clinics:

<i>Name</i>	<i>Location</i>
NATHAN GOLDSTEIN	Chicago, Ill.
NORMAN KAPLAN	Columbia, S. C.
GENETTE M. BURRUS	Dallas, Tex.
LAWRENCE S. ROGERS	Denver, Colo.
RICHARD SEARS	Detroit, Mich.
OLIVER FOWLER	Los Angeles, Calif.
PEARL GREENBERG	Newark, N. J. *
ELIAS ABRAMS	Newark, N. J.
VERNON V. SISNEY	New Orleans, La.
ARTHUR TEICHER	New York, N. Y.
WALTER COVILLE	New York, N. Y.
BERTRAM POLLENS	New York, N. Y.
FREDERICK WATTS	Philadelphia, Pa.
GEORGE LAPIDUS	Philadelphia, Pa.
RACHEL J. HAMILTON	Philadelphia, Pa.
CHARLES M. MORRIS	Philadelphia, Pa.
THOMAS F. JOHNSON	Philadelphia, Pa.
GRACE A. LEWIS	Philadelphia, Pa.
IRVING COBLENTZ	Pittsburgh, Pa.
WESLEY S. ROEDER	Portland, Oregon
GEORGE T. LODGE	San Francisco, Calif.
WILLIAM ADAMS	Seattle, Wash.
JEAN G. MIMS	Austin, Tex.
PAUL W. PENNINGROTH	Tampa, Fla.
DOROTHY P. MARQUIS	Detroit, Mich.
HEDDA BOLGER	Chicago, Ill.
I. LEON MAIZLISH	Chicago, Ill.

On Duty in Neuropsychiatric Hospitals:

<i>Name</i>	<i>Location</i>
IRENE HARMS	American Lake, Wash.
CECIL H. PATTERSON	Canadaigua, N. Y.
LAWRENCE M. BAKER	Lexington, Ky.
RAY D. CHARD	Lyons, N. J.
RALPH D. NORMAN	Lyons, N. J.
JOSEPH RESSNER	Mendota, Wis.
EDWARD A. MONAGHAN	Northport, L. I., N. Y.
GABRIEL ELIAS	Northport, L. I., N. Y.
EDWARD M. KRISE	Roseburg, Oregon
MARTIN MAYMAN	Topeka, Kans.
MARYLINE BARNARD	Topeka, Kans.
GEORGIANA BALL	Augusta, Ga.
JENNINGS	
ROBERT G. GIBBY	Fort Custer, Mich.
VERNON K. LUM	Fort Custer, Mich.
JULIAN L. PATHMAN	Downey, Ill.

On Duty in General Medical and Surgical Hospitals:

<i>Name</i>	<i>Location</i>
DAVID COHEN	Butler, Pa.
MARVIN W. WEBB	Bay Pines, Fla.
JOSEPH LEVI	Bronx, N. Y.
LEOPOLD WINTER	Bronx, N. Y.
IRVING HECHT	Bronx, N. Y.
BENJAMIN BLATT	Bronx, N. Y.
ESTHER C. WHITMAN	Framingham, Mass.
HARRY M. GRAYSON	Los Angeles, Calif.
CARL A. ANDERSON	Memphis, Tenn.
MILDRED B. MITCHELL	Minneapolis, Minn.
HELTON McANDREW	Richmond, Va.
MARNE L. GROFF	Washington, D. C.
HOWARD FRIEDMAN	West Roxbury, Mass.
NEDRA CRAEGER	Atlanta, Ga.
RALPH BERDIE	Nashville, Tenn.
ALFRED D. MUELLER	Memphis, Tenn.
J. LEWIS YAEGER	Hines, Ill.
DONALD A. SCHULTZ	Van Nuys, Calif.
JAMES H. LAWRENCE	Framingham, Mass.

The department of psychology of Amherst College announces an opening, beginning with the fall term for an instructor to assist with the laboratory work of the introductory course and to teach an advanced course each semester. Interested candidates should write Dr. Theodore Koester, Department of Psychology, Amherst College, Amherst, Massachusetts.

The Connecticut State Hospital, Middletown, Connecticut has vacancies for assistant psychologists in the psychological laboratories under the direction of Jules D. Holzberg. The salary is \$1860 to \$2340 and full maintenance at the hospital is provided at a deduction of \$316 a year. Individuals with a minimum of an MA in clinical psychology are preferred.

Applications should be submitted to the superintendent of the above institution.

The Wichita Guidance Center, Wichita, Kansas will have one senior and one junior internship open on or before June 1, 1947. The senior internship is open to applicants who have their Ph.D.'s or who are completing this degree and require supervised field work. The stipend is \$150 a month. The junior internship is open to applicants with an M.A. or those who require *only* supervised field work to complete this degree. The stipend is \$100 a month. Both internships may be renewed at expiration of the one-year appointment. Inquiries should be addressed to Dr. Jerry W. Carter, Jr., Director, Wichita Guidance Center, 3422 East Douglas Avenue, Wichita 8, Kansas.

The *Proceedings of the Maryland Conference on Military Psychology* are now off the press. In order to avoid the necessity for setting up arrangements for billing, it is requested that orders be accompanied by a check for \$2.60 which includes mailing costs. Orders should be addressed to Students' Supply Store, University of Maryland, College Park, Maryland.

It has been suggested that it would be of great assistance to the editors of the journals of the APA if authors who submit manuscripts would read the article by Anderson and Valentine, The preparation of articles for publication in the journals of the American Psychological Association, *Psychol. Bull.*, 1944, 41, 345-376. Particularly troublesome are the great varieties of forms in which the references are submitted in so many manuscripts. Reprints of the above article may be obtained from the Office of the Executive Secretary for ten cents a copy. Stamps are acceptable.

Copies of the *Directory of Applied Psychologists* published by the American Association for Applied Psychology in 1943 are still available. This directory lists former activities, academic training, societies, specialties, and the position of each psychologist in the AAAP at the time of publication. Copies may be secured for fifty cents from the Office of the Executive Secretary.

The Ann Arbor Press, printer of the APA Yearbook for the past several years, still promises early

publication of the 1946-47 Yearbook. It will be mailed to all APA members as soon as the printer completes it.

The U. S. Public Health Service announces that three types of grants, providing funds for training, for research, and for community services, may soon be available under the National Mental Health Act.

The USPHS is authorized to make grants to institutions offering training in psychiatry, clinical psychology, psychiatric social work, and psychiatric nursing, for the purpose of improvement, expansion, and inauguration of training programs in these fields. Application forms and complete information may be obtained from the Training and Standards Section, Mental Hygiene Division, U. S. Public Health Service, Washington 25, D. C. Since the National Advisory Mental Health Council expects to take final action on these applications by the middle of April interested schools are urged to make their applications now.

The USPHS has been authorized to grant a total of 600 stipends this year to graduate students in the following fields. Stipends ranging from \$1,000-\$2,400 a year for clinical psychologists, psychiatric social workers, and psychiatric nurses and up to \$3,600 for psychiatrists. These awards will be made through the institutions collaborating in this phase of the training program of the USPHS. Applicants are requested not to write to the training centers or the USPHS until the announcement of the institutions has been made, about May 1.

Grants for research on problems relevant to mental health may be made, upon the recommendation of the National Advisory Mental Health Council, to public and private institutions and to individuals. For application forms write to Research Grants Division, National Institute of Health, USPHS, Bethesda 14, Md.

Grants-in-aid will be made to States to assist in developing adequate mental health programs at the community level. Since the funds are handled by the mental health authority of each State, those interested in specific service projects should contact their State Mental Health Authority.

Funds to inaugurate actual operation of the programs depend on Congressional appropriations. The earliest date such funds may be available is July 1, 1947.

Convention Calendar

AMERICAN PSYCHOLOGICAL ASSOCIATION, INC.

September 9-13, 1947; Detroit, Michigan

For information write to:

Dr. Dael Wolfe, American Psychological Association
1515 Massachusetts Avenue, Washington 5, D. C.

ROCKY MOUNTAIN BRANCH OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

May 1-3, 1947; Colorado College, Colorado Springs

For information write to:

Dr. Lillian G. Portenier, Department of Psychology
University of Wyoming, Laramie, Wyoming

THE SOUTHERN SOCIETY FOR PHILOSOPHY AND PSYCHOLOGY

April 4-5, 1947; St. Louis, Missouri

For information write to:

Dr. Joseph Weitz, Sophie Newcomb College
Tulane University, New Orleans, Louisiana

SOUTHWESTERN PSYCHOLOGICAL ASSOCIATION

April 4-5, 1947; Dallas, Texas

For information write to:

Dr. L. B. Hoisington, Department of Psychology
University of Oklahoma, Norman, Oklahoma

MIDWESTERN PSYCHOLOGICAL ASSOCIATION

May 2-3, 1947; Edgewater Beach Hotel, Chicago, Illinois

For information write to:

Dr. Claude E. Buxton, Department of Psychology
Northwestern University, Evanston, Illinois

WESTERN PSYCHOLOGICAL ASSOCIATION

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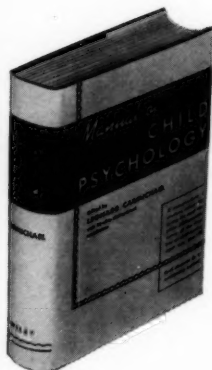
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